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ABSTRACT

Provided is a secondary education bicycle program guide designed for use in a general bicycle awareness course or as part of a driver education course. Chapter 1 of the guide contains the course objectives (psychomotor, cognitive, and affective) and a course outline organized into eight lessons. Each lesson lists lesson objectives, student performance objectives, and teaching procedures. The next twelve chapters provide information on various aspects of bicycling: driver education bicycle awareness; rules and regulations; bicycle statistics (accidents) and accident situations; bike usage; bicycle styles, selection, and proper fit; riding technique and evasive action; cycling procedures and practices; adjustment, repair, and maintenance; skill development (e.g., mount and dismount, turn, make emergency stops, etc.); hazard recognition, risk assessment, and decision making; and storing and securing. Concluding the guide is a list of resources and materials (texts, pamphlets and books, magazines and newspapers, films and filmstrips, and organizations). (JH)

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Nebraska Secondary Bicycle Program Guide

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CHAPTER 1

INTRODUCTION

Today's variable modern bicycle has increased the exposure of millions of Americans to the enumerable joys of bicycle riding. Young adults through the senior citizen age groups are selecting the bicycle in fulfilling a variety of needs, wants and beliefs.

Bicycling has now become a leading recreational activity; it keeps people physically fit, provides transportation and provides some answers for ecology and economy.

Commuters, campers, club riders, racers, recreationalists and the touring cyclist have increased the sales of bicycles to the point of outselling cars. With the increase in cycling use comes the associated increases in the number of accidents, injuries and deaths.

Bicycle safety education up to this point has primarily been relegated to the elementary grade levels and has concentrated on skill development and knowledge necessary for entry level into traffic and recreational riding.

The Nebraska K–6 Bicycle Safety Curriculum has addressed itself to that end. An ever-present need is for educational courses dealing with adult riding practices and an understanding of the highly complex multiple-speed bicycles used in today's traffic mix for the variety of uses in today's society.

This curriculum addresses itself to the development of courses or mini-courses to integrate educational bicycle programs for the young adult to gain an understanding and knowledge of the various aspects and uses by the adult cycling world.

It will also provide driver education teachers with a background of material to be incorporated into driver education programs. An awareness program incorporated within driver education programs will hopefully help the automobile driver become better able to share the highways with the bicyclist as part of our total transportation system.

To All Bicycle Enthusiasts and Instructors

Whatever a cyclist might be interested in undertaking, there are common knowledges needed that are necessary for safe cycling. This curriculum addresses itself to these knowledges along with units dealing with the specific interests of your students.

A general bicycle course might incorporate a portion of all the units to bring about the interest and an awareness of the various aspects of today's cycling activities, or individual units can be used in developing mini-courses which deal with specific activities, i.e., camping, touring, commuting, etc.

To Driver Education Instructors

Although much of the problem with motor vehicle/bicyclist accidents lies with the bicyclist, in many cases the motorist may not realize the bicycle is coming as fast as it is, crowd the bicycle in a right turn, pull out in front of it, pass without allowing 3 feet clearance, turn in front of a bicycle, open the vehicle door without looking back or just not see the cyclist because of non-correct searching patterns or awareness of other vehicle travel patterns in the total transportation system.

A bicycle awareness program is presented for your inclusion into driver education course curriculum.

COURSE OUTLINE AND OBJECTIVES

The Nebraska Secondary Program Guide Chapters deal with the various aspects of cycling activities. A full-length course can be developed by utilizing both class and actual riding experiences presented in the guide.

Individual chapters can be utilized separately or combined in emphasizing material in meeting student's needs and developed into shorter mini-courses..

Objectives

I. Psychomotor Domain

A. Care and Maintenance of the Bicycle

1. Ability to change tires
2. Ability to adjust seat and handlebars
3. Ability to perform minor repairs and maintenance

B. Bicycle Techniques

1. Fitting the bicycle to the cyclist
2. Mounting, dismounting and straight riding control
3. Techniques of shifting, pedaling, braking, turning and maneuvering
4. Riding techniques and emergency evasive actions while building endurance
5. Riding safely and efficiently in city traffic and open highways

II. Cognitive Domain

A. Understanding the place of bicycling as a partial solution to the transportation and environmental pollution problems

B. Physiological values of bicycling for fitness

C. The Derailleur Principle

D. Consumer knowledge of principles to follow when purchasing a bicycle

E. Preparation for a short trip as well as those for a weekend and longer duration

F. Gearing—why we have gears, when and how to use them

G. Safety rules of the road

H. Hazard recognition, risk assessment and decision making

III. Affective Domain

A. An appreciation of all-around physiological, social and emotional values to be derived from the co-educational, lifetime sport of bicycling

INSTRUCTIONAL SESSION OUTLINES

(The length of each session or number of lessions per outline will depend on the number of students, the available time, and the specific objectives desired in meeting the needs of the students.)

A. Lesson Outline: Driver Education Awareness Programs

1. *Objectives:*
   a) To develop in Driver Education students an awareness of the bicycle communication problems with the cyclist, and cooperation in the traffic flow with other users.
   b) To familiarize students with the laws identifying automobile drivers' responsibilities in sharing the road with cyclists.
   c) To illustrate the cycling hazards that precipitate conflict situations with cars.

2. *Student Performance:* Upon completion of this lesson, students will be able to:
   a) Demonstrate an awareness of the bicycle in the traffic flow by verbally identifying the cyclist and conflict points during the behind-the-wheel driving lesson.
   b) To state the traffic regulations as to the rights of the cyclist and the responsibilities of auto drivers to other road users.
   c) Given a particular situation, to identify the hazard and possible conflict and to describe what would be the safest procedure to follow.

3. *Procedures:*
   a) Do activities listed in Chapter 2.
   b) Xerox law sheet and information sheets: "Sharing the Road" and "What Motorists Should Know" for distribution to students.
   c) Discuss Chapters 3 and 4 (as listed in Chapter 2 Activities) pertaining to laws and statistics so students gain a better understanding of cyclist rights and responsibilities and the causes of accidents between cycles and automobiles.
   d) Discuss information sheets.
   e) Use accident case histories to discuss proper procedure in critical situations.

B. Lesson Outline: Course Introduction, Laws, Statistics, Usage, Bike Selection and Fit

1. *Objectives:*
   a) To acquaint students with course requirements.
   b) To build interest and enthusiasm for cycling through a film.
   c) To develop an understanding of Nebraska State Laws pertaining to bicycles.
   d) To help students gain an understanding of accident data analysis in relation to safe cycling.
   e) To familiarize students with the styles of bikes and their various uses, and in the selection process when purchasing a bike.
   f) To familiarize students with some of the parts of a bicycle and fitting the bike to the rider.

2. *Student Performance:* Upon completion of this lesson, students will be able to:
   a) State in general terms the state and local traffic regulations as they apply to bicycles and to pass a test on those regulations with 90% accuracy.
   b) State criteria for proper bike selection and to compare advantages of different sizes, models and makes of bikes.
   c) Properly fit a bicycle to an individual and to name parts of the bicycle.
   d) Identify the safety procedure to follow as indicated through accident data analysis.

3. *Procedures:*
   a) Brief lecture on course requirements including attendance, grading procedures, course content, materials and bicycles needed, supplemental readings and tests, if used.
   b) Show film "The Wonderful World of Bikes" or "Magic of the Bicycles" or other films geared to the adult bicyclist. (Available free loan listed in Resource and Materials, Chapter 14.)
   c) Discuss and comment on the film.
   d) Present Chapter 3 materials and discuss Nebraska laws pertaining to the cyclist.
   e) Present Chapter 4 materials and discuss cycling countermeasures to accident data and hazards.
   f) Present Chapter 5 and 6 materials. Invite a bicycle shop dealer as class speaker concerning the various models, prices, etc. available for purchase.
   Cyclists that commute or are involved in touring activities could also be asked to speak.
   g) Point out parts of the bike. Demonstrate how to fit your bicycle (seat height, handlebars, tire pressure, etc.). Assign students to make these adjustments on their bikes before bringing them to the next class.

C. Lesson Outline: Bike Adjustments, Inspection and Skill Development

1. *Objectives:*
   a) To review adjustments and inspect bicycles to make sure they are in good working order.
   b) To introduce students to basic skills–balancing, mounting, dismounting, start ups and straight line riding.
   c) To apply these basic skills to on-the-road experience.

2. *Student Performance:* Upon completion of this lesson, students will be able to:
   a) Make minor adjustments to their bikes.
   b) Make sure that all bolts, nuts, screws and other connectors are snug but not binding.
   c) Keep tires properly inflated.
   d) Perform basic skills of agility, balance, and bike control as described in the procedures section of this Chaper and Chapter 10.
   e) Apply skills through on-the-road riding.
   f) Explain and demonstrate to others how to ride a bike properly.

3. *Procedures:*
   a) Check student's adjustments of saddle, handlebars, tire pressure and loose nuts (Chapter 6). As approval is given, have students that can cycle test the bicycles in the immediate vicinity.
   b) Introduce basic skills (Skill Development Chapter 10)

      Exercise No. I mount and dismount
      II balance test
      III start up
      IV riding straight line

   c) Have students cycle where there is little traffic, or on a circuit for one or more laps applying the above skills.
   d) Discuss any problems.

D. Lesson Outline: Riding Techniques and Maneuvers, Derailleur Gear Shifting and Skill Development

1. *Objectives:*
   a) To acquaint students with riding techniques and evasive maneuvers.
   b) To familiarize students with gearing 3-speed and 10-speed derailleur.
   c) To apply the skills of shifting, riding techniques and evasive maneuvers in practice and range activity.

2. *Student Performance:* Upon completion of this lesson, students will be able to:
   a) Drive a bike more efficiently and safely than before.
   b) Shift gears and brake properly.
   c) Explain the efficient uses of gears and demonstrate the proper gear selection for the appropriate terrain and traffic environment.
   d) Perform skill exercises as presented in Chapter 10.

3. *Procedures:*
   a) Discuss materials in Chapter 7.
   b) Introduce gearing–why we have gears and how and when to use them.
      i) If possible use a demonstration model from a local bicycle shop.
      ii) If not available, turn bike upside down and have students observe gear mechanism in action (cranks must be turning as you shift).
   c) Introduce skills on range from Chapter 10–Skill Development.
      i) No. V – maneuver and change balance
      VI – short radius turn
      VII – quick direction change–by sight
      VIII – quick direction change–by sound
      IX – avoiding accidents and dodging
      XII & XIV – controlled and emergency stopping
      XIII – riding efficiency–ankling
      ii) Have students practice gearing. They should feel the difference of pressure with high gears as opposed to easiness of pressure for low gears.

E. Lesson Outline: Bicycle Repair and Maintanance, Skill Development

1. *Objectives:*
   a) To familiarize students with tire care and techniques for emergency repairs.
   b) To familiarize students with cleaning and routine maintenance checks.
   c) To demonstrate bicycle repair, replacing cables, brake blocks, lubricating properly and replacing chain if it falls off chain wheel.
   d) To review basic skills and practice additional skills.

2. *Student Performance:* Upon completion of this lesson, students will be able to:
   a) Change or repair tires and tubes.
   b) Lubricate chains and other parts needing periodic care.
   c) Replace brake and gear cables.
   d) Avoid damaging those parts of the bike which require the skills, knowledge and special tools of the trained bike mechanic.
   e) Keep the bicycle properly maintained.

3. *Procedures:*
   a) Discuss tire care and demonstrate step-by-step techniques for repairing flat tires.
   b) Discuss material in Chapter 9–adjust, repair and maintenance.
      i) If possible invite a bicycle mechanic to discuss and demonstrate maintenance of the bicycle.
      ii) Have students bring tools to make adjustments and practice repairs and maintenance.
   c) Review basic skills for cycling techniques and emergency skills.
   d) Discuss group cycling and practice skill development (Chapter 10) Exercises X and XI.

F. Lesson Outline: Procedures and Practices, Skill Development and Endurance Conditioning

1. *Objectives:*
   a) To develop an understanding of the procedures for driving in traffic and short rides on traveled roads.
   b) To provide road experience and develop physical endurance for longer rides.
   c) To provide further road experience under a variety of conditions—hills, country roads and traffic.

2. *Student Performance:* Upon completion of this lesson, students will be able to:
   a) Apply cycling skills and knowledge through road experience.
   b) Show a concern for safe cycling by observing traffic regulations and safe biking practices
   c) Cycle 10 miles at an even pace without fatigue.

3. *Procedures:*
   a) Discuss procedures for driving in traffic (Chapter 8) and take a short drive on well-traveled roads (2–3 miles).
   b) Hand out map designating routes of trip and know hazards that might be encountered. Assign a mature cyclist to "lead the pack." The instructor should be last to assist those along the way with problems. Designate at least one stopping point where all can catch up.
   c) Upon completion of trip, meet briefly with students for comments and suggestions.
   d) Discuss problems individually with those who encounter them.
   e) Practice cycling laps of a perimeter road (approximately 10 miles). This may be done as a time trial where each person goes at an even pace; record the time and use it as a comparison for a second time trial at the end of the course.
   f) Administer supplementary tests from Chapter 10.

G. Lesson Outline: Hazard Recognition, Risk Assessment, Decision Making, Storing and Securing the Bike, Cycling for Physical Fitness

1. *Objectives:*
   a) To familiarize students with hazards and the degree of risk involved in performing safe cycling (Chapter 11).
   b) To provide specific situations as indicated by the accident types (Chapter 4) in determining the best possible maneuvers for accident avoidance in the development of risk assessment and decision making.
   c) To provide information concerning the safe storing and securing of the bicycle.
   d) To familiarize the students with the physical fitness benefits derived from cycling activities.

2. *Student Performance:* Upon completion of this lesson, students will be able to:
   a) Identify the hazardous situations that confront cyclists and to choose the correct safe response.
   b) Perform the safest possible maneuver for accident avoidance in the situations indicated by the accident types.
   c) Select the proper techniques and methods for storing and securing the cycle.
   d) Measure the effect of cycling activity on an individual's physical fitness.

3. *Procedures:*
   a) Discuss Chapter 11 material. Develop and show slides of cycling hazards. Possibly use perceptual film strips.
   b) Review Chapter 4—have students discuss safest maneuvers for accident avoidance.
   c) Discuss Chapter 12—Storing and Securing. Have a police officer as class speaker regarding theft problems.
   d) Have the students secure their cycles correctly in various locations.
   e) Have students keep a weekly log of biking activities.
   f) Have students record heart rate and calculate the percent of his highest heart rate he is using (Chapter 13).
   g) Students should participate in bike rides of increasing distances, great enough for effective conditioning.

H. Extra class projects:

- Participate in at least one bike hike or overnight tour and campout.
- Go on an all-day bicycle hike, 30 to 35 miles, with picnic lunch.
- Join a bike club and participate in its activities.
- Read books and articles and view films about tours and racing.
- Subscribe to magazines on cycling.

CHAPTER 2

DRIVER EDUCATION BICYCLE AWARENESS

TEACHING GUIDELINES

The Problem

Bicyclists are the most vulnerable of all road users. They have no other protection than their maneuverability and stopping distance. The lack of protective shielding, that encompasses the automobile, makes the bicyclist a loser in a conflict with a motorized vehicle.

Recently, the Anacapa Sciences made a detailed study of the causal factors leading to crashes in more than 1,000 bicycle/auto crashes across the country. Under the direction of Senior Psychologist Kenneth Cross they found a common cause in many traffic accidents involving bicyclists was "the blind eye of the motorist."

A frequent statement by the motorist was that he did not see the bicyclist until it was too late. The bicyclist, on the other hand, claimed that the motorist looked straight at him and so he assumed that he had been seen. The study revealed that the scanning patterns of the motorist were specifically beamed at other automobiles. Because the bicyclist is a relatively unfamiliar object on the roadway, with a low profile and only a fleeting image at that, the bicycle failed to trigger any defensive action on the part of the motorist in time to avoid the crash.

The study also showed that bicycle/auto accidents occurred as often on residential streets as they did on busy roads, primarily because the bicycle was an unprogrammed image in the traffic scanning pattern of the motorist and because the bike rider frequented unexpected areas where speeds and visibility were both low.

The erratic and illegal maneuvers of the bicyclist in unexpected places, such as exiting from driveways and sidewalks onto public roads, riding on the wrong side of the street, and failure to stop or yield at controlled intersections, were the bicyclists' principal contribution to crashes.

In Nebraska the 10-34 age group comprised 71% of all pedalcycle accidents but account for only 40% of the total population.

Age – 10-34
Total Accidents – 269
Percent of Population – 39%
Percent of Pedalcyclist Accidents – 71.1%

Three hundred forty-seven (92%) of the pedalcycle accidents occurred in urban areas. Failure to yield was a contributing circumstance in 48% of the cases. Forty-two (11%) of the pedalcycle accidents occurred at night.

For the state as a whole, the number of total bicycle accidents over a five year period (1972-76) was the lowest in 1976. This may be a reflection of increased bicycle safety regulations for new bikes distributed in January 1976 by the Consumer Product Safety Commission.

Year	Total Accidents	Fatal
1972	414	11
1973	421	5
1974	419	3
1975	411	5
1976	379	5

Even though this represents only 9% of all state accidents in 1976, the economic loss attributed to these accidents (379) was approximately $5 million. The large number of accidents involving bicyclists warrant coverage in the driver education program.

It is important that bicycle safety discussion becomes an integral part in the Nebraska driver education curriculum. The following are suggestions for inclusion in the curriculum:

1. Laws relating to the responsibilities of the motor vehicle operator as they regard sharing the road with the bicyclist should be emphasized.

2. Conflict situations between motorists and bicyclists should be illustrated on the chalkboard and discussed.

3. Bicycle use, as compared to the motor vehicle, should be explained to show the legitimate use of the bicycle as a vehicle, not a toy.

4. Hazards to bicyclists which may not be hazards to motor vehicles should be identified and discussed.

5. Classroom, behind-the-wheel, and student activities can be used to supplement the basic program, giving greater coverage to the problem, yet using minimal classroom time.

Activities

1. Discuss the laws as they relate to the bicyclists. Law sheets regarding the bicyclists are included in Chapter 2 for reproduction and distribution. Also, a law sheet is included in this chapter for showing the responsibilities and regulations for the automobile driver in sharing the highway.

2. Identify various ways that bicycles and motor vehicles may come in conflict. Once these are identified discuss what each can/must do to avoid collision.

   Examples would be opening car door, cutting bicyclist off at the corner when motorist turns right and bicyclist goes straight, motorist turns left in front of bicyclist, etc. This can be done both in the classroom during the behind-the-wheel phase.

3. Identify hazards to bicyclists that may not be hazards to motorists such as situations which a bicyclist may have to avoid by going left into the traffic lane.

   Examples would be chuck holes, gravel, broken edge of pavement, dogs, debris, etc. Slides may be made of these and shown in class or have students identify these hazards during behind-the-wheel instruction. Evasive actions or adjustments in separating, minimizing or cooperating by both the bicyclist and motorist should be discussed.

4. Have students list bicyclist hazards observed on the way home.

5. Have students observe bicyclist/motor vehicle interaction and list violations, conflicts and dangerous actions.

6. Have students interview bicyclists to determine what problem they encounter with motor vehicle operators.

7. Discuss engineering and traffic flow problems associated with bikeways such as where sidewalk paths cross or bike lanes go through intersections.

8. Discuss accident analysis data presented in Chapter 4. Point out and emphasize the motor vehicle/bicycle conflicts that are causing the greatest collisions.

9. Show film showing the bicycle/motor vehicle mix. "Only One Road" is an example, and available from AAA.

NEBRASKA LAW AND COURTESY REQUIRES US TO:

1. SHARE the road with bicyclists. Bicycles are vehicles, and are entitled to their share of the roadway.

2. ALLOW at least 3 feet clearance when passing a bicycle, and stay clear until safely past. A warning toot of the horn is OK, but not a loud blast.

3. LOOK BACK and watch out for bicyclists before opening the car door on the traffic side.

4. NEVER turn sharply right or left in front of bicyclists, or crowd a biker against the curb or off the road. Realize that bumps, holes or the wind from passing vehicles, can mean trouble for a bicyclist.

SHARING THE ROAD WITH BICYCLES

1. EXERCISE DUE CARE AND ALLOW AT LEAST 3 FEET CLEARANCE WHEN PASSING A BICYCLIST. MOVE IN FRONT OF THE BICYCLE ONLY WHEN SAFELY CLEAR OF THE OVERTAKEN BICYCLE.

2. ALLOW FOR WIND EFFECT WHEN PASSING--DON'T "BLOW THE BICYCLIST" OFF THE ROADWAY.

3. TOOT YOUR HORN 150 TO 200 FEET PRIOR TO PASSING. DON'T WAIT UNTIL RIGHT BEHIND THE BICYCLIST TO BLAST YOUR HORN.

4. LARGE RIGHT OUTSIDE REAR VIEW MIRRORS MAY CATCH A BICYCLIST BEHIND THE HEAD--ALLOW PLENTY OF ROOM WHEN PASSING.

5. DIM YOUR HEADLIGHTS WHEN MEETING A BICYCLIST--BRIGHT LIGHTS COMPLETELY BLIND THE BICYCLE DRIVER.

6. BE ALERT FOR COMMON BICYCLIST VIOLATIONS SUCH AS DRIVING ON THE LEFT SIDE OF THE ROAD AND DRIVING AT NIGHT WITHOUT A LIGHT.

7. BE ALERT FOR STUNT DRIVERS AND BICYCLISTS WHO MIGHT SUDDENLY PULL IN FRONT OF YOU.

8. BE ESPECIALLY ALERT AT INTERSECTIONS AND DRIVEWAYS.

9. LOOK TO THE REAR PRIOR TO OPENING YOUR MOTOR VEHICLE DOOR--YOU MAY FORCE THE BICYCLE DRIVER INTO TRAFFIC OR INTO YOUR DOOR.

10. BE CAREFUL NOT TO CUT THE BICYCLIST OFF AT A CORNER WHEN TURNING RIGHT. CHECK YOUR RIGHT SIDE AND BLIND SPOT.

11. LIGHTWEIGHT BICYCLES MAY BE TRAVELING FASTER THAN YOU EXPECT--AVOID PULLING OUT IN FRONT OF THEM.

12. LOOK AHEAD FOR HAZARDS TO BICYCLISTS THAT MAY NOT BE HAZARDS FOR MOTOR VEHICLES, I.E., SMALL HOLES, GRAVEL, SMALL PIECES OF GLASS, ETC.

13. ALLOW THE BICYCLIST TO SHARE THE ROAD, REMEMBER HE HAS A LEGAL RIGHT TO BE THERE.

14. BICYCLISTS SOMETIME RIDE IRRESPONSIBLY; BE PREPARED TO TAKE ACTION TO AVOID AN ACCIDENT.

15. MAKE EYE CONTACT WITH A BICYCLIST IN TRAFFIC TO LET HIM KNOW YOU ARE AWARE OF HIS PRESENCE AND TO BE SURE HE IS AWARE OF YOURS.

16. BECAUSE OF THEIR LOW PROFILE, BICYCLES ARE OFTEN NOT NOTICED IN TRAFFIC SITUATIONS, LOOK CAREFULLY BEFORE TURNING, MERGING OR CHANGING LANES.

17. YIELD RIGHT OF WAY TO THE BICYCLIST WHERE PROPER, HE HAS THE SAME RIGHTS ON THE ROAD AS OTHER DRIVERS.

18. BE COURTEOUS EVEN IF IT TAKES A LITTLE LONGER, REMEMBER THERE IS A FRAGILE HUMAN BEING RIDING THAT BICYCLE.

19. MANY MOTORISTS DO NOT RECOGNIZE THE BICYCLE AS A LEGITIMATE FORM OF TRANSPORTATION. THE DRIVING ATTITUDE WHICH THEY MAINTAIN TOWARD BICYCLISTS IS NOT ONLY UNSAFE, BUT OFTEN ANTAGONISTIC.

20. BICYCLES ARE HERE TO STAY. ADJUST YOUR DRIVING TO INCLUDE THEM IN A SAFE, ORDERLY TRAFFIC FLOW.

21. BICYCLISTS, AS A CLASS, INCLUDE MANY UNQUALIFIED DRIVERS. APPROACH THEM WITH CAUTION.

WHAT MOTORISTS SHOULD KNOW ABOUT CYCLISTS

Cycles have: less stability than cars, more maneuverability, quicker lateral movement.

Cycles are entitled to the same rules, regulations and responsibilities on our highways.

Cycles have no protective covering like a car. Even minor crashes can easily cause severe injury.

Cycles are less stable than a car, loss of control can be caused by:

- skidding on slick surfaces.
- hitting an obstacle or hole in the road.
- improper steering and driver balance.
- mechanical failure (broken chain).
- lack of driver concentration and awareness.

A cycle has no wipers–fog and dampness can prevent clear sight.

Multiple speed bikes must be shifted, which takes extra time and concentration.

Crossing railroads correctly means that the following cars need to allow more space.

Clues for recognizing beginning cyclist:

- cycle often wobbles.
- looks down constantly while shifting.
- cycling motion is uneven due to problem shifting.
- hesitates making traffic decisions.

Cyclists in bad weather react slower. Drivers become numb from cold, dampness and rain, stiffness or tiredness from physical exertion.

*Keep eyes and head moving and actively SEARCH for cycles.

Because of the difficulty for motorists to judge speed of cycle and distance (mainly because of its size) cycles may appear to be moving slower than they really are or be further away than they really are.

Cyclists at intersections have the same right-of-way rules; yield to vehicle on the right or in the intersection. When making a left turn, yield to on-coming cars/cycles.

Cyclists are hidden much easier by trees, shrubs, bushes, and parked cars. Pull out or continue *only* when you can see that the way is clear.

When parking, check over your shoulder and in the mirror before opening the car door. Practice the 3 L's: LOOK, LEVER, LEAVE.

If you see a cyclist begin to lean slightly, expect the rider to make a turn in the direction of lean.

Dim headlights when approaching any oncoming vehicle at night. This is extra important when only one headlight shows. Bright headlights could temporarily blind the cyclist.

Cyclist's view through rear view mirror may be limited because of vibration, blurring the image. Give sufficient warning to pass.

Wind waves created by the car can cause cyclists to wobble and lose control if you pass too closely.

After passing cyclist, give greater distance before coming back. This cuts down the chances of tires throwing dust or rocks which could hit the cyclist.

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CHAPTER 3

RULES AND REGULATIONS–THE LAW

Nebraska Motor Vehicle Laws 39-686. Traffic laws apply to persons riding bicycles. (Taken from LB 45, 1973.)

(1) Any person who rides a bicycle upon a roadway shall have all of the rights and shall be subject to all of the duties applicable to the driver of a vehicle under sections 39-601 to 39-6,122, except for special bicycle regulations in sections 39-601 to 39-6,122 and except for those provisions of sections 39-601 to 39-6,122 which by their nature can have no application.

(2) Regulations applicable to bicycles shall apply whenever a bicycle shall be operated upon any highway or upon any path set aside by the Department of Roads or local authority for the exclusive use of bicycles.

Source: Laws 1973, LB 45, 86.

39-687. Parental duties; child less than sixteen. The parent or guardian of any child, who is less than sixteen years old, shall not knowingly permit any such child to violate any of the provisions of sections 39-601 to 39-6,122.

Source: Laws 1973, LB 45, 87.

39-688. Riding of bicycles; prohibited acts. (1) Any person who rides a bicycle shall not ride other than upon or astride a permanent and regular seat attached thereto.

(2) Any person who rides a bicycle shall not remove his feet from the pedals and shall have at least one hand on the handlebars at all times.

(3) Any person who operates a bicycle shall not carry any package, bundle, or article which prevents such operator from keeping at least one hand upon the handlebars.

(4) No bicycle shall be used to carry more persons at one time than the number for which it shall be designed and equipped.

39-689. Clinging to vehicles; prohibited. Any person who rides upon any bicycle, coaster, roller skates, sled, skis, or toy vehicle shall not attach such or himself to any vehicle upon a roadway.

Source: Laws 1973, LB 45, 89.

39-690. Riding bicycles on roadways and bicycle paths; on right side; single file; regulation by local authority. (1) Any person who operates a bicycle upon a roadway shall ride as near to the right side of the roadway as practicable, exercising due care when passing a standing vehicle or one proceeding in the same direction.

(2) Any person who rides a bicycle upon a roadway shall not ride more than single file except on paths or parts of roadways set aside for the exclusive use of bicycles.

(3) Whenever a usable path for bicycles has been provided adjacent to a roadway, bicycle riders shall use such path and shall not use such roadway.

(4) Local authority may, by ordinance, further regulate the operation of bicycles and may provide for registration and inspection of bicycles.

Source: Laws 1973, LB 45, 90.

39-691. Equipment on bicycles; lights; brakes. (1) Any bicycle when in use at nighttime shall be equipped with a light on the front which shall emit a white light visible from a distance of at least five hundred feet to the front on a clear night and with a red reflector on the rear of a type approved by the department or local authority which shall be visible on a clear night from all distances between one hundred feet and six hundred feet to the rear when directly in front of lawful lower beams of headlights on a motor vehicle. A light emitting a red light visible from a distance of five hundred feet to the rear may be used in addition to such red reflector.

(2) Any bicycle used on a highway shall be equipped with a brake which will enable the operator to make the brakes wheel skid on dry, level, clean pavement.

Source: Laws 1973, LB 45, 91.

BICYCLISTS MUST OBEY TRAFFIC LAWS, SIGNS AND SIGNALS

Cyclists should keep within 3 feet of the edge of the unobstructed roadway. After dark bicycles must be lighted and reflectorized.

On or after April 1, 1976, no commercial dealer shall sell or offer to sell at retail any bicycle unless such bicycle is equipped with pedals which display a white or amber reflective device or material on both the front and rear surfaces of the pedal and such reflective surface shall be visible during the hours of darkness from four hundred feet when viewed from the front or rear under low beam headlamps of a motor vehicle under normal atmospheric conditions. All bicycles shall also be equipped with tires bearing a white or silver retroreflective material on each side, or a wide-angle reflector mounted on the spokes of each wheel. Such retroreflective material shall be at least three-sixteenths of an inch wide and shall be affixed as an integral part of the tire or wheel and shall remain effective for the life of the tire or wheel. The spoke-mounted wide angle reflector devices shall have a reflective surface of at least two square inches and shall be clear, amber, or red in color. Both the retroreflective tires and wide-angle spoke reflectors shall be visible, during the hours of darkness, from a distance of four hundred feet when viewed under the low beam headlamps of a motor vehicle under normal atmospheric conditions, when the bicycle is traveling at a ninety degree right angle to the direction of travel of the motor vehicle and is directly in front of such motor vehicle. Such reflective devices shall remain visible when the bicycle is turned forty degrees in either direction from such angle and crosses directly in front of such motor vehicle at a distance of four hundred feet.

As slow moving vehicles, they may not obstruct traffic unnecessarily, but must yield to faster traffic.

LB45 Section 65. (1) No person shall drive a motor vehicle at such slow speed as to impede the normal and reasonable movement of traffic except when reduced speed is necessary for safety operation or in compliance with law.

Responsibility in passing parked cars is a two-fold responsibility. The driver of a motor vehicle has the primary responsibility according to law to not open a car door without interfering with the movement of other traffic.

The bicyclist as he drives along might be dead right but he is just as dead as if he were wrong. The bicyclist then has the responsibility to be alert and aware of the conflicts that could cause severe injury if a collision occurred and to avoid those conflicts.

LB45 Section 78. No person shall open the door of a motor vehicle on the side available to moving traffic unless and until it is reasonably safe to do so and it can be done without interfering with the movement of other traffic, nor shall any person leave a door open on the side of a vehicle available to traffic for a period of time longer than necessary to load or unload property or passengers.

In some of the latest literature on bicycling some cycling enthusiasts are advocating right arm signaling for indicating right turns. In the State of Nebraska this would be illegal.

LB45 Section 53. (1) Any stop or turn signal when required in this act shall be given either by means of the hand and arm or by signal lights, except as otherwise provided in this section.

(4) . . . bicycles . . . shall not be required to have or maintain in working order signal lights but they may be so equipped. The operator thereof shall comply with the requirements for utilizing hand and arm signals. . . .

LB45 Section 54. All hand and arm signals required by this act shall be given from the left side of the vehicle in the following manner and such signals shall indicate as follows:

(1) Left turn—hand and arm extended horizontally;
(2) Right turn—hand and arm extended upward, elbow bent, and;
(3) Stop or decrease speed—hand and arm extended downward, elbow bent.

LB45 Section 33. Prohibits the operation of bicycles on freeways. Specific authorization in Section 90 that local authority may, by ordinance, further regulate the operation of bicycles as well as providing for registration and inspection.

All other motor vehicle regulations are applicable to the bicyclist as part of the traffic system.

Teachers should check to see if local regulations have any additional laws affecting the cyclist.

CHAPTER 4

BICYCLE STATISTICS

National Study

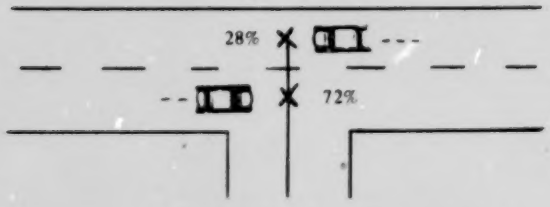
The National Highway Traffic Safety Administration funded a recent 4 year study of 166 fatal and 753 non-fatal bicycle/motor vehicle accidents in 1974. The study was done by Dr. Kenneth Cross of Anacapa Sciences, Inc.

The study was limited to bicycle/motor vehicle accidents, since this type accounts for the greatest percentage (82%) of all serious and fatal injury accidents. Motor vehicle/bicycle accidents account for only an estimated 1% of all bike related accidents. The overwhelming majority of bike accidents involve falls of various sorts, few of which result in serious injury or fatality.

A summary of the study which identified and classified 37 mutually exclusive bicycle/motor vehicle accident types follows:

Class A

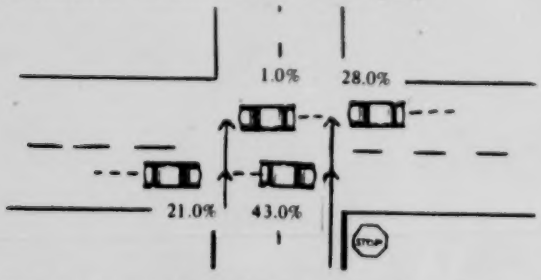
Bicycles Rideout – Driveway, Alley, Midblock



Roadway is nearly always on two-lane residential street with light traffic. Bicyclist rides straight out of driveway or alley and collides with motor vehicle from left near lane 72% of the time or from the right in far lane 28% of the time.
Fatal – 6.7%
Non-fatal – 5.6%
Median age is 10 years – 10% were younger than 5½

Class B

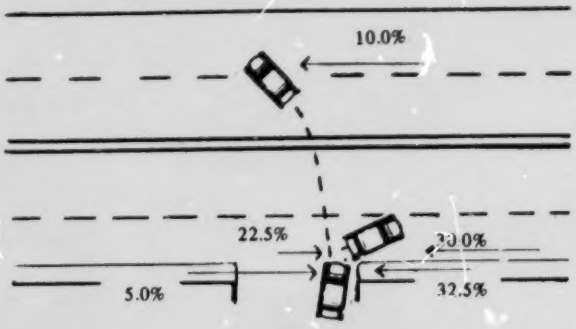
Bicycle Rideout – Intersection controlled by sign



Prior to the accident 22% were riding facing traffic. The bicyclist failed to slow or stop at an intersection controlled by a stop sign.
Fatal – 7.8%
Non-fatal – 10.1%
10% – 7 years or younger
50% – 12 years or younger
90% – 16 years or less

Class C

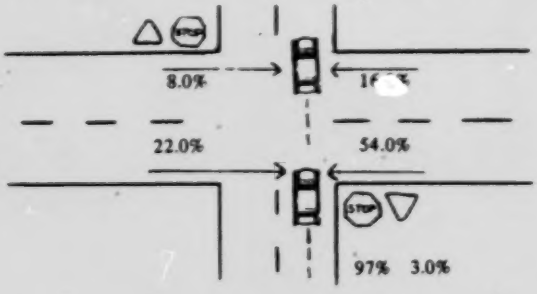
Motorist Turn – Driveout Commercial Driveway/Alley



Motorist exited from a commercial driveway after stopping. 63% of the bicyclists approached from the right–on sidewalk or in street facing traffic.
90% were older than 10
50% older than 15
Fatal – 0.0%
Non-fatal – 5.4%

Class C

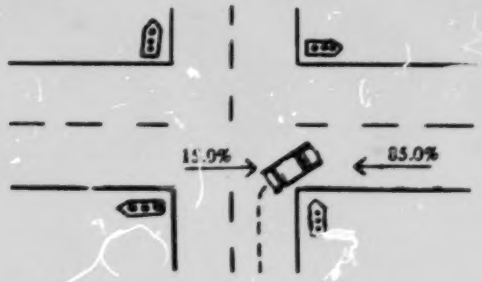
Motorist Crossover – Intersection controlled by sign



54% occurred in near lane and involved a bicyclist who was riding against traffic. 21% occurred in far lane, many traveling against traffic.
Fatal – 1.2%
Non-fatal – 10.1%

Class C

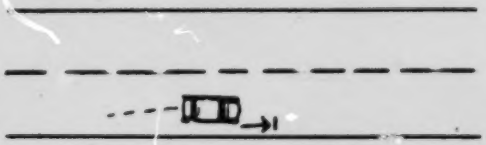
Motorist Turn – Intersection controlled by signal



Motorist makes a right turn-on-red. In 85% of the cases the bicyclist was riding against traffic.
Fatal – 24.0%
Non-fatal – 5.1%

Class D

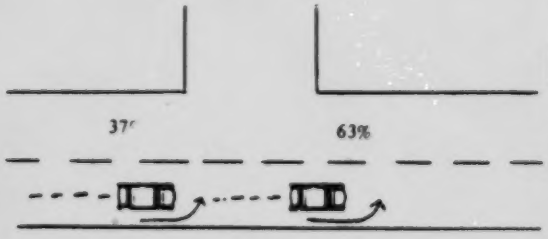
Motorist Overtaking



Motor vehicle overtakes and collides with bicyclist traveling same direction–mainly on a narrow, rural-type roadway–and 80% occur during darkenss. Only 12% of bikes involved in night accidents were equipped with a legal headlight.
10% – 8 years old or younger
50% – 12 years old or younger
Less than 10% were older than 15
Fatal – 24%
Non-fatal – 5.1%

Class E

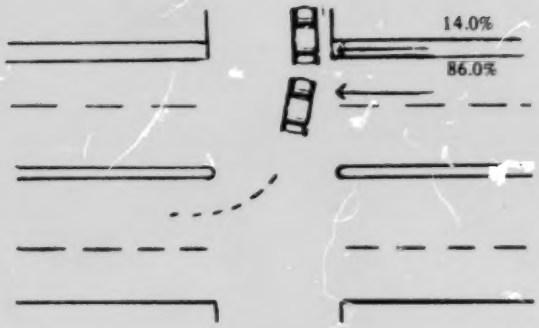
Bicyclist unexpected left; Turn same direction



Bicyclist suddenly turned left into path of an overtaking motor vehicle. Most of these accidents occurred because bicyclist did not scan to the rear before initiating his turn.
10% – 8 years old or younger
10% – older than 18
Median age was 13 years old
Fatal – 8.4%
Non-fatal – 8.4%

Class F

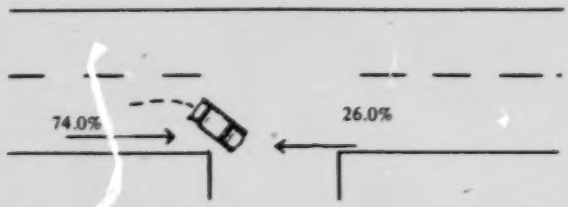
Motorist unexpected left turn



This accident occurs when a motorist turns left into the path of a legally riding bicyclist approaching from the opposite direction. In nearly every case the bicyclist detected the motorist, recognized that the motorist was planning to turn left, but assumed the motor vehicle would remain stationary until the bicyclist had cleared the intersection. 86% of the cases–bicyclist was riding legally, otherwise on the sidewalk. 25% occurred at night and involved an unlighted bike.
Fatal – 0.0%
Non-fatal – 7.0%

Class F

Motorist unexpected right turn



More than 1/4 of the cases involved a wrong-way bicyclist. Almost 3/4 of the accidents occur when the motorist turns right into the path of a bicyclist approaching from the right rear. This accident type almost always involved a teenager or adult. 90% were older than 13 and half were over 18.
Fatal – 1.8%
Non-fatal – 5.0%

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Wrong-way riding is a factor in many accident types and classes. According to the cross study riding facing traffic was a factor in nearly 30% of all accidents.

Class B accidents all occur at intersections which are controlled by either a sign or a traffic signal. In all cases, the bicyclist rides out, fails to stop, slow or yield when required by the sign or signal, and rides out into the intersection.

Not all bicyclists exhibit the same respect for traffic signs and signals. Most, thank goodness, stop when they see that familiar red, octogonal sign, but others just sail right on through. Teenage and adult bicyclists often fail to stop. Experienced bicyclists will talk for hours about why they should not be required to stop for stop signs; about why not stopping is sensible, safer, more efficient use of their energy and altogether a different case than that of a motor vehicle driver at the same sign.

Running a stop sign, however, is illegal. Part of this problem is a lack of enforcement.

Overtaking accidents account for 37.8% of all bicycle/motor vehicle accident fatalities. Nearly 80% of the overtaking accidents took place at night. Only 12% of the night accidents involved bicycles that did have lights. 65% of the motorists stated that they did not see the bicyclist until it was too late. The majority of the accidents occurred on narrow, rural roads.

A bicyclist who avoids night riding and rides responsibly is just not likely to be hit from behind, according to the cross data.

Case histories illustrate the major accident patterns associated with bicycles. They are:

(1) Loss of control – this occurs because of difficulty in braking and shifting, riding double, riding too large a bike and striking a rut, bump or obstacle.

(2) Mechanical and structural problems – these include brake failure, wobbling or disengagement of the wheel or steering mechanism; shifting problems, chain slippage, pedals falling off, and spoke breakage.

(3) Entanglement of a person's feet, hands or clothing in the bicycle.

(4) Foot slippage from pedal.

(5) Collision with a car or another bicycle.

NEBRASKA PEDALCYCLE STATISTICS

Data Source: Nebraska Accident Record File and 1970 Nebraska Census Population.

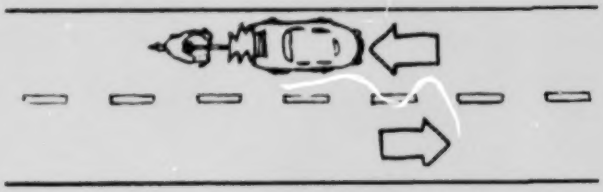
Number of 1976 accidents
Fatal – 5
Non-fatal injury – 372
Property damage only – 2
Economic loss attributed $5,080,000 to the above accidents
Percent of all state accidents – 0.9%
Percent of total economic loss – 2.0%

Analysis: The age group from 15 to 34 had 100 accidents out of the total number of 379 for 28.5% of the pedalcycle accidents. This group comprises 28.7% of the total population. (See Table 2.)

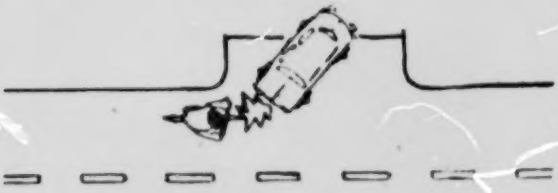
- 347 (92%) pedalcycle accidents occurred in urban areas. Failure to yield was a contributing factor in 48% of the cases.
- 127 (45%) were in Omaha and 78 (21%) occurred in Lincoln.
- 42 (11%) of the accidents occurred at night.

1 The bicyclist is driving on the wrong side of the street

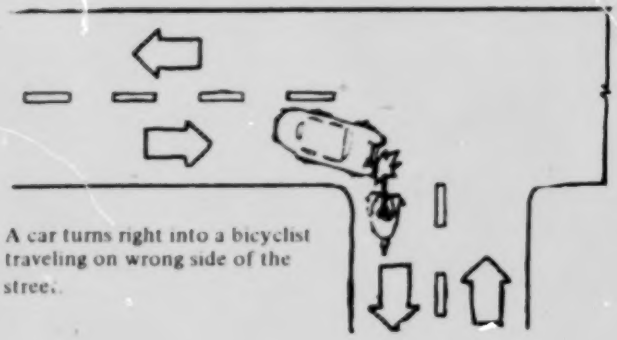
You are on the wrong side of the street if you are driving your bicycle and facing other traffic traveling in the same lane you are in. This means that the front of the bicycle and the front of the automobiles are moving toward each other. Driving on the wrong side of the street is against the law and is extremely dangerous because other drivers do not expect you to be coming from the wrong direction. The drawings show some of the many possible accidents that can occur when a bicyclist drives on the wrong side of the street:



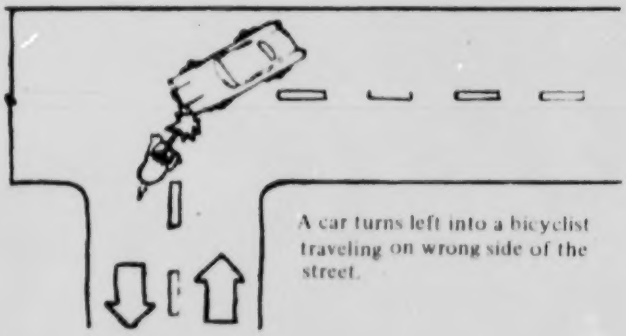
A car runs into a bicyclist who is going the wrong way on a two-way street.



A bicyclist meets a car pulling out from a driveway.



A car turns right into a bicyclist traveling on wrong side of the street.

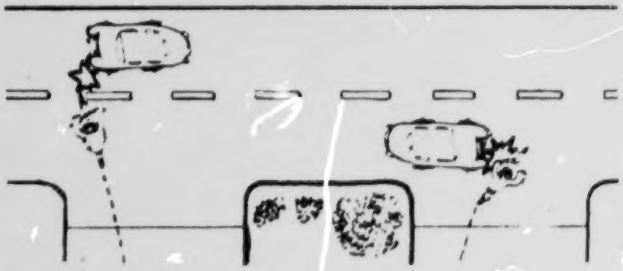


A car turns left into a bicyclist traveling on wrong side of the street.

2 The bicyclist exits from a driveway into the motorist's path.

Intersections where driveways and streets meet are hazardous. Bicyclists often do not look carefully enough for moving traffic when they ride onto the street from a driveway. This is very dangerous. Sometimes parked cars make it difficult for bicyclists to see traffic that is moving on the street, but there are no excuses for not looking carefully. It is up to the bicyclists to *wait* until it is safe before riding into the street from a driveway.

The drawing shows some common accidents that occur when bicyclists do not yield to other traffic when the cyclists come out of a driveway.



A bicyclist rides out of a driveway and crosses the street into the path of a moving car.

A bicyclist rides out of a driveway and is hit by a car moving near the driveway.

3 The motorist exits from a driveway into the cyclist's path.

It is not illegal to drive a bicycle on the sidewalks in many Nebraska cities. However, many accidents still happen when a bicyclist is driving on the sidewalk and a motorist is backing out of a driveway. The motorist should look to see whether anyone is on the sidewalk before backing out of a driveway. However, since cycling on the sidewalk is against the law in many cities, motorists may not expect a bicyclist to be traveling on the sidewalk. This makes it more likely that the bicyclist will not be seen.

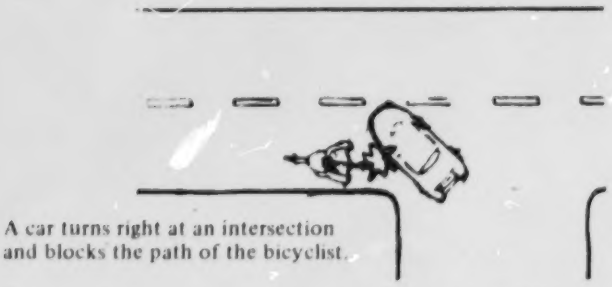
Do not drive on the sidewalk unless it is designed as a bikeway. Watch for cars coming out of driveways. Also watch for motorists entering the roadway from a commercial driveway.

A car drives out of a commercial driveway and into a bicyclist on the street.

A car backs out of a driveway and into a bicyclist on the sidewalk or roadway.

4 A motorist makes an improper right turn.

A bicyclist approaching from the right rear of an automobile is difficult for a motorist to see. This occurs because the design of many motor vehicles makes it hard to see vehicles approaching from the right rear. Many bicyclists are not aware of this hazard and are not as cautious as they could be when they are traveling on the right-hand side of vehicles preparing to make a right turn. Another reason that an accident can happen easily in these instances is that motorists do not expect a bicycle to be to the right of them. Watch for brake lights and turn signals of other vehicles so that you know what they are going to do; and always ride carefully so you will be prepared if a motorist does make an improper turn.

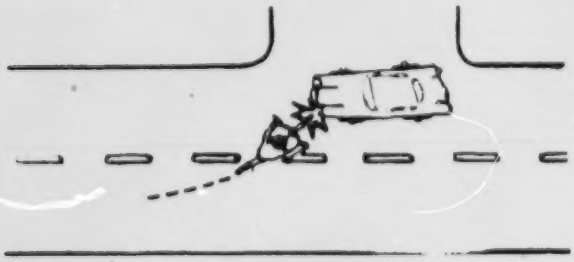


A car turns right at an intersection and blocks the path of the bicyclist.

A car moves to the right to a parking space and collides with the bicycle.

5 The bicyclist makes an improper left turn.

Bicyclists often make mistakes turning left. Sometimes they do not think that the approaching car is traveling as fast as it really is. If bicyclists do not watch carefully enough for other vehicles, they may very likely cause accidents. Some examples of accidents caused by unsafe left turns are presented in the drawings.

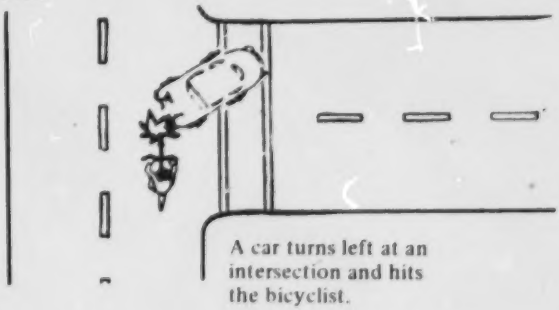


A bicyclist turns left into a driveway and into the path of the motorist.

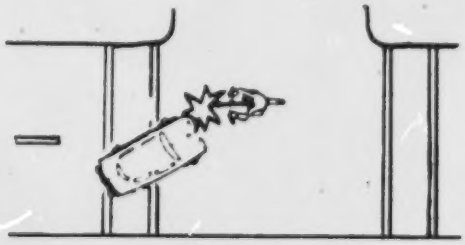
A bicyclist turns left at an intersection and into the path of the vehicles moving in both directions.

6 A motorist makes an improper left turn.

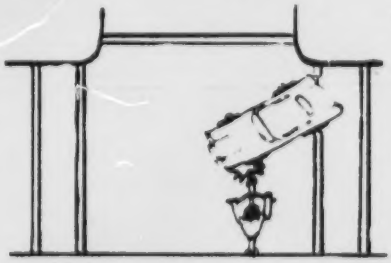
When a motorist does not yield the right-of-way to a bicyclist, an accident often occurs. Sometimes the motorist fails to yield because he or she underestimates the speed of the approaching bicyclist. Judging the speed of a vehicle directly ahead of you is very difficult, so bicyclists should be very careful when they see motor vehicles that may turn left in front of them. The important point to remember is that motorists may not see you even if you are directly ahead of them.



A car turns left at an intersection and hits the bicyclist.



A car turns left into a driveway and adds another statistic to the growing number of motor vehicle-bicycle accidents.

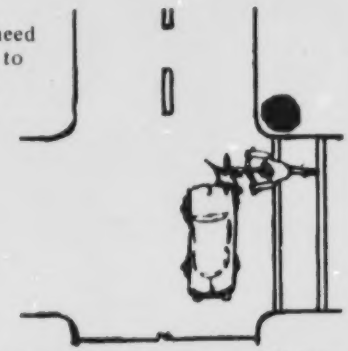


A car turns left an an intersection and blocks the path of the bicyclist.

7 The bicyclist fails to stop or to yield at a controlled intersection.

A controlled intersection is where two streets cross and there are stop signs, signal lights, or a yield sign. Accidents happen when bicyclists do not stop and yield as the signal requires. Ignoring stop signs, yield signs, and signal lights is *very* risky. Obeying traffic signals is absolutely necessary for safety.

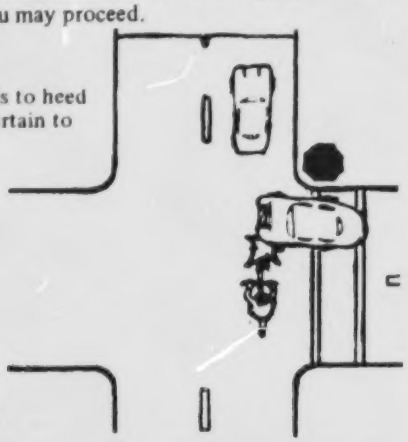
The bicyclist who fails to heed stop signs is almost certain to end up in a hospital bed or the morgue.



8 The motorist fails to stop or yield at a controlled intersection.

When a motorist hits a bicyclist at a controlled intersection, it usually happens because the motorist did not see the bicyclist. The motorist may first stop at the stop sign and then proceed into the intersection because he or she failed to see the approaching bicycle. It is important to remember that motorists are usually well trained to look for other motor vehicles but poorly trained to look for bicycles. Since they do not expect bicycles, they may not see them even though they look! Never assume you have been seen by a motorist. Move slowly when approaching an intersection until you are sure it is safe to go; then you may proceed.

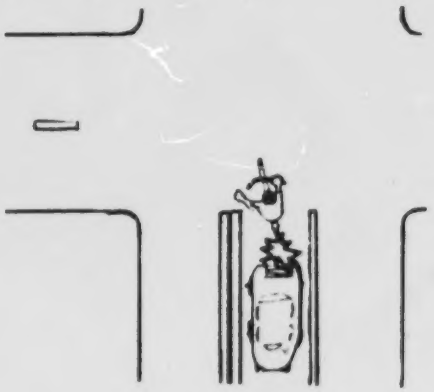
The motorist who fails to heed stop signs is almost certain to cause an accident.



9 The motorist collides with the rear of the cyclist.

Accidents in which the motorist collides with the rear of the bicyclist happen occasionally. Be sure to look to the rear before you move around parked cars or move away from the curb. Also avoid narrow, busy streets when you can take a safer route.

The bicyclist avoids a parked car but is hit from behind by a moving vehicle.

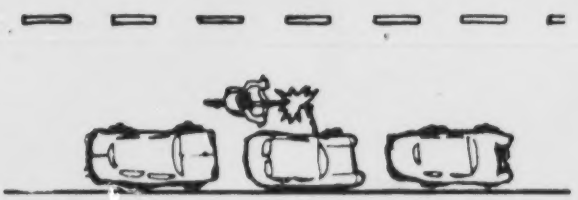


A motorist may not expect a bike to be in the left turn lane.

A motorist pulling out of a parking space may be more concerned with what is behind than ahead and thus hits a bicyclist.

10 The motorist opens the car door into the cyclist's path.

As you drive your bicycle alongside parked cars, watch for people inside the cars that are preparing to get out. When drivers and passengers of parked cars open their doors into the path of a bicyclist, a serious accident can occur. Often people in cars do not look carefully enough for bicyclists before they open their doors. Sometimes the bicyclists are moving so fast that they surprise people in cars. Remember that riding alongside parked vehicles is dangerous. Be prepared to stop to avoid car doors.



The motorist opens the car door, and the bicyclist hits the door.

CHAPTER 5

BIKE USAGE

In 1966 there were approximately 60 million cyclists riding 37 million bikes. As the demand for bicycles increased, the demand for light-weight bikes increased even more.

The bike is no longer child's play. Since 1960 bicycle popularity has greatly increased. Then the bicycle population was estimated at 23.5 million riders. In that year, 3.7 million bicycles were sold and less than 12% of these were used by adults.

By comparison, in 1972 bicycles zoomed to 13.7 million—an increase of 10 million units a year—and a million more units than automobiles. Fifty percent of the bicycle sales were for adult usage. It is now estimated that there are more than 51 million bicycles in use today.

Ecology and an appetite for casual recreation have contributed to the popularity of bicycle riding, but the more important factor is in the transportation usage.

The new enthusiasm by adults for bicycling stems from its rediscovered virtues. In a period of time when there is growing ecological concern in the nation, people see the bicycle's fine qualities as a good transportation mode for city and urban purposes. The bicycle offers no pollution, low upkeep, no noise, small space use, reliability, non-congestion, a healthful means of exercise and lots of fun.

The recent influx of bike riders is made up mostly of adults. Improved light-weight construction, coupled with multi-speed gearing, has made bicycling a much more appealing form of transportation.

Although young adults (17-25 age group) make up a large segment of the new breed of bicyclists, virtually every age group is represented.

Two groups of adult cyclists, commuters and recreationalists, have become recognizable during the last five years. The first group has turned to bicycles as a means of transportation.

Commuters—People are genuinely concerned about pollution and traffic congestion. Then too, the bicycle is more economical to operate than the automobile. These advantages, coupled with convenience and economy, have won many converts to bicycle commuting.

Recreationalists—The second group, recreation seekers, are bicycling in their ever-increasing leisure hours. The opportunity for improved physical fitness requiring only a manual expenditure on equipment has lured many people into the sport.

The light-weight bicycle, the type most frequently purchased by adults, is designed for use with a narrow tread tire which operates well only on solid smooth surfaces. Today's automobile-oriented society has made few provisions for safe, practical and paved routes.

The adult cyclist, being more adventurous, is subject to more dangers. The commuting adult bicyclists will ride from residence to vocation by the most practical direct route. This type of riding, which often occurs during rush hours, greatly increases the bicyclist's exposure to high-speed automobile traffic, a constant source of danger.

When competing with an auto for a traffic corridor, there is always the fear of being struck by a moving vehicle.

Motorists, however, are not entirely to blame. Many of the cyclists on today's highways are both inexperienced and uninformed. The bicycle is similar to the automobile in that its operation requires not only physical and judgmental capabilities, but also handling experience. Many of the cyclists on today's streets are adults who are newcomers to the operation of modern light-weight bicycles. Thin tires mounted on a light-weight frame make control difficult for most beginning drivers. This awkwardness is compounded on those models having hand brakes mounted on drop-type racing handlebars. The end result is a novice bicyclist, traveling an uncertain path, who is often too engrossed in routine bike operations to be sufficiently alert to those emergency situations which invariably pop-up in heavy traffic.

Many bicyclists have often driven into the opening door of a parked car or been forced into a rim-bending curbstone. Chuck holes, which only jar an auto, can cause a bicyclist to lose control. A more serious threat is the grate-covered storm drain which can trap a rolling wheel and propel the rider crashing head-over-handlebars onto the pavement. Even a small dog is a menace if the distracted bicyclist veers into the line of traffic. The hazards of a simple spill are lethally multiplied when the bicycle is closely followed by a swift-moving vehicle.

Touring & Racing—The recreational bicyclist is faced with similar dangers. Soon the novelty of riding around the block wears off and he is attracted to touring or possibly road racing.

The needed agility will result only from a regular and graduated bicycling program which progresses as new skills are acquired.

COMMUTING

Using the bicycle for going to and from work, to school and home, on shopping trips and for local in-town traveling has increased the bicyclist inter-traffic mix on our streets and highways. Bicyclists are commuting in larger numbers each year for a variety of reasons, not withstanding the advantages gained in economy, ecology and exercise.

Larger Nebraska communities are constantly developing bike lanes, paths and signed routes in providing a safer route for bicyclists to travel.

The first activity for a bicyclist is to determine the most desirable route, direct as possible for commuting. Practice runs are desirable, if possible, before actually departing on a planned route where a time schedule or arrival time at your destination is a necessity.

You will find certain streets not acceptable and an alternate route should be planned.

Highway planners have generally established routes for the expediency and movement of the automobile driver. Many streets are designed for the movement of large volumes of automobiles. Where traffic at peak hours is exceptionally heavy alternative routes, even though a little farther, may be advantageous for the bicyclist to consider.

Consideration must also be given to the condition of the roadway and other major problems. One with chuck holes, storm drains with open grates, accumulated debris, narrow lanes, multiple turning lanes, 5-way intersections, major shopping center parking lots with constant vehicle movement entering and exiting, streets with known dogs and streets lined with parked cars could be avoided, if possible. Many times this is not totally possible, and an awareness of these hazards should be encountered with caution and alertness.

The acceptance of the bicyclist as part of the transportation system is predicated on the smooth flow of intermixing with other highway users. Basic to this system is the obedience of all the participants to the rules and regulations of the road and obeying the law.

Driving to the right, stopping for all stop signs and lights, stopping before entering traffic from driveways and alleys, riding in the correct direction on one-way streets, not slowing down traffic unnecessarily, using proper hand signals, having proper lane positioning for turns and adjusting to yield situations will help other road users respect and accept the bicycle as a transportation mode.

At the same time the bicyclist must do everything possible to increase his visibility for car driver awareness, develop and gain an understanding of driving techniques in traffic as to avoid the high accident type incidences, and avoid conflict situations that could lead to an impact point.

The bicyclist could be RIGHT – DEAD RIGHT, BUT JUST AS DEAD AS IF HE WERE WRONG. In many cases right-of-way must be yielded even when the right-of-way belongs to the cyclist.

Except for inclement weather, clothing isn't a major problem. In most cases clothing can be worn that one wears for everyday work. If enough time is allowed for a leisure pace, clothes will not become sticky or sweaty and will not have to be changed. During very hot weather, however, some cyclists will take along a different change of clothing in a saddlebag to change into once they reach their destination. A bright knapsack with reflectorized tape will not only increase visibility and carry extra clothing, papers, lunch bag and other items, but will also keep the hands free to steer and brake.

For those who pedal to work, especially in the winter months when daylight hours are shorter, adequate lights are necessary to make the motorist aware of the bike commuter. A poorly lighted bicycle is also a danger to pedestrians who may not hear or see an approaching bicycle.

If slacks or loose pants (that could catch in moving wheels, pedals and sprockets) are worn, leg clips or bands will hold the pant legs tight.

Bicycle helmets should be worn. Some of the most serious injuries are of the head and a helmet may help prevent the bicyclist from becoming a statistic.

Additional comments on commuter riding follow. They were suggested by Gerry Brooks, Chairman of the Mayor's Bicycle Committee of Lincoln.

(1) Always scan parked cars for someone who might open a door in your path. (You should use compromising, separating and minimizing techniques for decreasing hazard potential.)

(2) Don't violate red lights or stop signs.

(3) Never enter an intersection when you cannot see clearly in both directions. Your hands should be on the handbrake ready for use, particularly when a stale light has been on. Eye scanning should be increased, and ears should not exclusively be relied upon. Be ready to stop.

(4) Gear down on a multiple speed bike before you reach an intersection. If you have to stop you can then start up with less risk of laboring through the intersection.

(5) If a car pulls up beside you at a corner, look for his signal lights. Even if he does not signal a right turn (or a left turn on a one-way street) watch his front wheel when he starts up.

(6) Before contesting the right-of-way with a car entering right or left or coming straight, establish eye contact with the driver. If you can't, be sure to get out of the way.

(7) In areas where cars stop to let out passengers, watch out for those that pull to the curb in front of you. In such situations, watch the passenger carefully. He or she may open the passenger door in your path.

(8) Don't mess with buses. Drivers may see you, but they will pull out in front of you, pull to the curb ahead of you, or not quite ahead of you, and generally make your life miserable.

(9) Watch out for cars coming out of alleys. You can usually see them better than they can see you.

(10) If you can't get a break in traffic in order to cross a busy street, dismount and become a pedestrian. You then have a better chance of being seen and of crossing safely.

(11) At night, or in inclement weather, light yourself as much as possible and assume that you still cannot be seen.

(12) Stay off major traffic thoroughfares unless you are very fit and competent as a cyclist. Many of these roads are narrow, and have storm drains that will admit your front wheel with no room for avoidance.

(13) If you don't want cars turning around you when you are stopped at a controlled intersection (and you plan on traveling straight), then occupy the inside of the turning lane.

TOURING

A casual drive to the open lands bordering the city, although enjoyable and challenging, is soon replaced with the desire to change scenery and travel farther, seeing the country from a bicycle.

The touring bicyclist has several options available while on a trip. Those with money could spend nights in motels and eat in restaurants just like regular tourists. Hosteling is another option which offers many of the conveniences of motels without the high cost. Many cyclists also prefer to camp out.

Prior planning is an important step. The first stage would be to decide where to go and the easiest way to get there. Driving to a national park or forest, in most cases, may be out of the question as they are generally many miles from major cities. The National Park Service currently classified 232 miles of trails within its parks as suitable for bicycle use.

There are various public transportation modes available for transporting the cycle to the town nearest a National Park or to other cycling areas and camp sites. Transporting bikes is done by airlines, buses, trains and, of course, by using carrier racks on cars. The Public Transportation System often requires that the bike be boxed. You should always make prior arrangements with them.

Many bike tourists carry their machines to the start of a tour route on an automobile, train, plane, or bus. If the automobile is used, the tourist has the advantage of saving some cash in transportation both ways, but loses some time. Also, the car must be left unattended, in most cases, and conceivably could be stolen or stripped of parts.

You should select a destination, keeping it within the bounds of a reasonable distance from your point of departure. Next, obtain comprehensive area maps from the State Highway Department or local chamber of commerce. Generally you can go anywhere on a bicycle that you can go in a car—it's just that finding a suitable route may be more difficult. The maps will show you the roads to avoid and those marked in blue are usually suitable.

Most states do not allow bikes on limied access highways (interstates and freeways) without a special permit, and then only when no other road exists. The old road that parallels an interstate highway frequently offers a haven for the cyclist.

On a modern 10-speed bike the average person should be able to pedal 12 or more miles in an hour's time, and usually between 45 to 60 miles a day as a starter. Though book learning and advice from friends may help, only experience can completely prepare you for the multi-day tour. So get out and ride.

Handlebar bags have snap-on straps for easy attachment. Make sure it doesn't rub on front tire.

Equipment for Touring

The Bike A 10-speed is almost a necessity in order to have enough gearing range to make cycling easy for hill climbing and the various terrain.

Handlebars should be turned down for more efficient cycling. The clips and straps should be attached to the pedals. Efficiency loss would result without them.

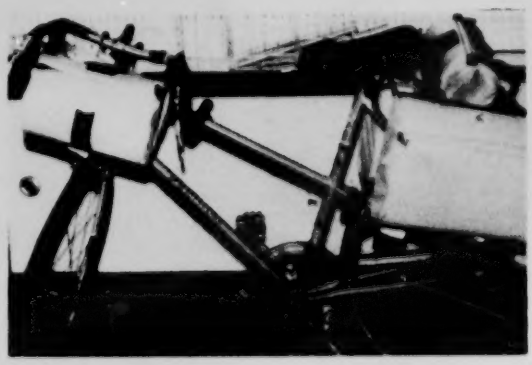
Tires This is a matter of choice, although most of the experienced riders seem to prefer using tubular tires.

Racks Rear bicycle racks are available for use with pannierbags. The rack should be securely attached either to the seatpost clamp or the seat stays, not to the rear axle.

Carrying Bags There are three types of bike bags. Handlebar, saddlebags and panniers. Handlebar bags fit over the front handlebars and are used for carrying much-used small items.

Pannier bags hang on both sides of the rear carriers, which carry the bulk of the load. Saddlebags are strapped to the rear of the seat; generally they are used for carrying tools and spare parts.

Keeping the load balanced and low on the frame is the right way of carrying equipment.



Tools–A screwdriver, small crescent wrench, spoke wrench, free wheel cluster remover, chain rivet extractor, spare derailleur and rear brake cable, a tube repair kit and a spare tubular tire should be included.

Sleeping Bag–Down bags are compact, warm, and light weight, but are usually expensive.

Tents–Many cyclists, when the weather permits, do not use tents; however, a tent is a practical accessory to carry along just in case the weather changes. A plastic sleeve called a tube tent is often used. Shop in stores that cater to back-packers for your light-weight camping needs.

Cooking Equipment–The white gas-burning Primus stove is used by many back-packers and mountaineers and is usually available at any camping or sporting goods store. Fuel should be carried in a flat metal one-pint can. An eye dropper to aid in filling the priming bowl should also be taken along.

Mess Kit–Small army or scouting mess kits are available. An aluminum 3-cup sauce pan, plastic cups, knife, fork, spoon, can opener, and a small stainless steel frying pan (which may also be used as a plate) complete the kit.

Clothes–A pair of moderately light slacks with a full cut so they can fit over shorts are used by many. Some use warm-up suits. Bicyclists can also use: a pair of bicycle shorts or full-cut, bermuda-type shorts; two pairs of socks; two pairs of shorts; two bicycle riding jerseys or knitted sports shirts; a light, nylon-style windbreaker jacket; rain cape; a hat which will keep the sun out of your eyes, afford some protection from the rain and act as a headband during the heat; pair of bicycle gloves; pair of long-fingered gloves for cold weather; and a pair of light shoes or sneakers for walking around camp and for a change of shoes.

Miscellaneous Items–Soap, scouring pad, wash cloth, towel, light twine, small flashlight, razor, toothbrush and paste, insect repellent and sunburn lotion are needed. You may want to include a small transistor radio.

Food–Whatever type of food you desire, keep it light and compact. Many campers wait until arriving at their destination to secure food. Purchase enough for supper, breakfast and a packed lunch.

Local or area bicycle clubs often sponsor tours. Contact your chamber of commerce for information about clubs.

The American Youth Hostels, Inc. AYH National Campers, Delaplaine, Virginia 22025 can be contacted for information.

The AYH Council established in Nebraska is the Nebraska-land Council, 3357 Holdrege Ave. Lincoln, Nebraska 68503.

YOUTH HOSTELS IN U.S.A.

There are more than one hundred Youth Hostels including supplementary accommodations extending across the U.S. Regular hostels offer accommodations for between $1 and $2 a night. Supplementary accommodations are available to hostellers at somewhat higher fees.

*open all year S.A. supplementary accommodations

EASTERN REGION

CONNECTICUT
1. Sugar House, Canton
2. Bantam Lake, Lakeside *

MAINE
3. Bear Mountain Village, South Waterford *

MARYLAND
4. North Branch, Cumberland *
5. Kiwanis, Sandy Hook
6. Old Stonehouse, Seneca

MASSACHUSETTS
7. Strathmore House, Brookline S.A.
8. Christ Church, Boston
9. Lingham Home, Framingham
10. Old Lilacs, Granville
11. Hy-Land, Hyannis, Cape Cod
12. La Salette, Ipswich S.A.
13. Friendly Crossways, Littleton
14. Star of the Sea, Nantucket
15. Midcape, Orleans
16. Camp Karu, Pittsfield S.A.
17. Mount Everett, Sheffield
18. Springfield College Camp, Springfield
19. Little Meadow, Sunderland
20. Little America, Truro, Cape Cod
21. Lillian Manter Memorial, West Tisbury, Martha's Vineyard

NEW HAMPSHIRE
22. Green Tops, Alton
23. E. Charles Goodwin Community Center, Claremont
24. Ragged Edge, Danbury *
25. Gray Ledges, Grantham *
26. North Conway Community Center S.A.
27. The Lime Kilns, North Haverhill
28. Cotton's, Warren

NEW JERSEY
29. Old Mine Road, Hainesville *

NEW YORK
30. N.Y. Student Center, Hotel McAlpin S.A.*
31. Sloane House "Y" S.A.*
32. Niagara Falls Y.M.C.A. S.A.*
33. Downing, Syracuse

PENNSYLVANIA
34. Bowmansville
35. Cannon Hill, Brickerville
36. Rising Waters, Bushkill
37. Denver
38. Ridley Park, Media
39. Shirey's, Geigertown
40. La Anna *
41. Chamounix Mansion, W. Fairmount Park, Philadelphia *
42. Weisel Park *

VERMONT
43. Sterling School, Craftsbury Common *
44. Lowell *
45. Putney School, Putney
46. School House, Rochester *
47. Old Homestead, Warren *
48. Ski Hostel Lodge, Waterbury Center *

WEST VIRGINIA
49. Chestnut Ridge Camp, Morgantown *

DISTRICT OF COLUMBIA
50. Washington International *

SOUTHERN REGION

GEORGIA

51. Dixie Rest Mo
51. Dixie Rest Motel, Bainbridge S.A.*

NORTH CAROLINA

52. Camp Carmel, Linville

MID-WEST REGION

ILLINOIS

53. SIU Little Grassy, Carbondale *
54. Y.M.C.A. Hotel, Chicago S.A.*
55. Galena *
56. Palos Park *

INDIANA

57. Dunes Lakeshore, Chesterton *

IOWA

58. Oneota, Decorah
59. Andy Mountain, Harper's Ferry S.A.
60. Wesley House, Iowa City S.A.

MICHIGAN

61. Bessemer-Indianhead, Bessemer
62. Friedenswald, Cassopolis *
63. Y.M.C.A./Y.W.C.A., Detroit S.A.*
64. Blue Lake, Kalkaska *
65. Foote, Milford *

MINNESOTA

66. Cliff Wold's Canoe, Ely
67. Gunflint Canoe, Grand Marais
68. Crow Wing Trails, Sebeka
69. Twin Cities, St. Paul *

MISSOURI

70. Epworth Among the Hills, Arcadia *
71. Shannondale Community Center, Gladden *
72. Lewis & Clark, Kansas City *

NEBRASKA

74. Ponda Rosa, Buffalo City
75. Wesley House, Lincoln S.A.*

OHIO

76. Myeerah, Bellefontaine *
77. Wintergarden Community Lodge, Bowling Green *
79. Community Camp, New Plymouth
80. Huston's, Toledo *

WISCONSIN

80A. Rock River, Beloit
81. Ches Perry, Cable *
82. Deepwood Ski Lodge, Colfax
83. The Red Barn, Greendale
84. Friendship Farm, Kansasville
85. The Farmhouse, Tomah
86. Two Rivers *

WESTERN REGION

ALASKA

87. Juneau Methodist, Juneau

ARIZONA

88. Aspen Lodge, Alpine
89. Bisbee Y.W.C.A. *
90. Congregational Church Flagstaff *
91. Arizona Rancho Motor Lodge, Holbrook *
92. The Outfit, Tucson

CALIFORNIA

93. Mountain Home Ranch, Calistoga
94. Meadowlark Farm, Hemet *
95. Armed Services Y.M.C.A., Long Beach S.A.*
96. Hidden Villa Ranch, Los Altos *
97. Laguna Beach Ranch, Pt. Reyes *
98. Cal-Expo, Sacramento *
98A. San Diego *

COLORADO

99. Boulder S.A.*
100. Rocky Mt. Camp, Divide
101. Rockwood Ranch, Durango

HAWAII

102. Hale Aloha, Honolulu *

MONTANA

102A. Alpine Lodge, Bozeman S.A.*

UTAH

103. Alpine Prospector's Lodge, Park City *
104. Venice, Venice *

WASHINGTON

105. The Lodge, Ashford *
106. North Branch Y.M.C.A., Spokane *

WYOMING

107. The Hostel, Jackson Hole S.A.*

BICYCLE CLUB ORGANIZATION

To organize a club, study the area. Locate other clubs and their scope, also list bicycle dealers. Contact these people for cooperation.

Along with bicyclists in your neighborhood, plan a bike meeting. This could be a social in someone's home or in a public building.

A bicycle meeting should be characterized by everyone bringing his bike, either riding it or hauling it in. A bike ride should be a part of most meetings.

Here are a few suggestions:

(1) Announce meeting by card, letter or phone call. Make up your mailing list of known bicycle enthusiasts.
(2) Give a press release out to newspapers, television and radio.
(3) Find a good talker to chair the meeting—one who is positive with people—and who understands exactly what you are trying to do.
(4) A chairperson for the project should be elected or appointed.
(5) Develop a constitution and by-laws (sample following).
(6) Develop membership forms.
(7) Establish membership dues.
(8) Appoint a secretary and treasurer.
(9) Launch membership drive.
(10) The president, at least, should affiliate with the League of American Wheelmen.

CONSTITUTION AND BY-LAWS

ARTICLE I

Name and Colors

Name— a non-profit corporation.
Colors—Red and White

ARTICLE II

Aims

Promotion of cycling and hosteling. Encourage recreational cycling activities.

Public recognition of the need for safer cycling conditions.

Encourage public facilities for cycling and hosteling.

Cooperate with public authorities in the observance of all traffic regulations.

Advocate registration of bicycles.

ARTICLE III

Membership

Section 1. Regular member minimum age limit 16 years. Family membership—available through regular members' responsibility.

Section 2. Applicant shall be elected by a majority vote at any regular meeting. Should application be rejected, fees will be returned.

ARTICLE IV

Dues

Annual dues payable April 1. By July 1, non-paying members will be dropped.

Family Membership–$1.00 over 16 and $ .50 under 16, per member. Sustaining Membership–$1.00 per year per member.

Parent's or guardian's signature necessary for approval of membership under age 21.

ARTICLE V

Officers

1. Elected annually first week in July.
2. Elected officers and committee chairmen shall constitute Executive Board.
3. President–presides, appoints committees (with approval of Board). Answers for Club in all matters.
4. Vice President–assumes President's functions in his absence.
5. Secretary–keeps minutes, membership records, handles correspondence, subscriptions, notices.
6. Treasurer–responsible for finances, fund raising plans, budget planning, collects dues, makes financial report.
7. Road Captain–Chairman's Tour Committee, in charge of all runs, supervises all runs, substitutes for President or Vice President.

NATIONWIDE SYSTEM OF TRAILS

National Recreational Trails

Legend: B—bicycle; F—foot; H—horse; M—motorized, general; SM—snowmobile; WC—wheelchair

INDEX

NO. STATE: NAME OF TRAIL (LENGTH) TYPE OF TRAIL, ADMINISTRATING AGENCY

1. Alaska: PINNELL MOUNTAIN TRAIL (24 miles) F, Bureau of Land Management, USDI
2. Washington: LAKE WASHINGTON BICYCLE PATH (2.5 miles) B-F, City of Seattle Department of Parks and Recreation
3. Washington: LAKE WASHINGTON SHIP CANAL WATERSIDE TRAIL (1,200 feet) F, U.S. Army Corps of Engineers
4. Washington: FRED CLEATOR INTERPRETIVE TRAIL (1.3 miles) F, Washington State Parks and Recreation Commission
5. Oregon: TILLAMOOK HEAD TRAIL (6 miles) F, Oregon State Highway Division, State Parks and Recreation Section
6. California: KING RANGE TRAIL (10 miles in 2 segments) F-H, M, Bureau of Land Management, USDI
7. California: SOUTH YUBA TRAIL (6 miles) F-H, Bureau of Land Management, USDI
8. California: EAST BAY SKYLINE TRAIL (14 miles) F-H, East Bay Regional Park District
9. California: GABRIELINO TRAIL (28 miles) F-H, Forest Service, USDA
10. Arizona: SOUTH MOUNTAIN PARK TRAIL (14 miles) B-F-H, Phoenix Parks and Recreation Department
11. Colorado: HIGHLINE CANAL TRAIL (18 miles) B-F-H, South Suburban Metropolitan Recreation and Park District, Denver
12. New Mexico: ORGAN MOUNTAIN TRAIL (8.7 miles) F-H, Bureau of Land Management, USDI
13. South Dakota: BEAR BUTTE TRAIL (3.5 miles) F, South Dakota Department of Game, Fish and Parks, Division of Parks, Division of Parks and Recreation
14. South Dakota: SUNDAY GULCH TRAIL (4 miles) F, South Dakota Department of Game, Fish and Parks, Division of Parks and Recreation
15. South Dakota: TRAIL OF SPIRITS (0.5 mile) F, South Dakota Department of Game, Fish and Parks, Division of Parks and Recreation
16. Nebraska: FONTENELLE FOREST TRAIL (3.9 miles) F, Fontenelle Forest Association
17. Texas: GREER ISLAND NATURE TRAIL (3 miles) F, City of Fort Worth Park and Recreation Department
18. Arkansas: SUGAR LOAF MOUNTAIN NATURE TRAIL (1 mile) F, U.S. Army Corps of Engineers
19. Wisconsin: ELROY-SPARTA TRAIL (30 miles) B-F-SM, Wisconsin Department of Natural Resources, Bureau of Parks and Recreation
20. Wisconsin: ICE AGE GLACIAL TRAIL (25 miles) F-SM, Wisconsin Department of Natural Resources, Bureau of Parks and Recreation
21. Illinois: ILLINOIS PRAIRIE PATH (12.5 miles) B-F-H, The Illinois Prairie Path, Inc.
22. Kentucky: LONG CREEK TRAIL (0.25 mile) F-WC, Tennessee Valley Authority
23. Tennessee: LAUREL-SNOW TRAIL (8 miles) F, Bowaters Southern Paper Corporation
24. Georgia: STONE MOUNTAIN TRAIL (6.51 miles) F, Stone Mountain Memorial Park Association
25. District of Columbia: FORT CIRCLE PARKS TRAIL (7.9 miles in 2 segments) B-F, National Park Service, USDI
26. Pennsylvania: FAIRMOUNT PARK BIKEWAY (8.25 miles) B-F, City of Philadelphia, Fairmount Park Commission
27. New Jersey: PALISADES LONG PATH (11 miles) F, Palisades Interstate Park Commission
28. New Jersey: PALISADES SHORE TRAIL (11.25 miles) F, Palisades Interstate Park Commission
29. New York: HARRIMAN LONG PATH (16 miles) F, Palisades Interstate Park Commission

CHAPTER 6

BICYCLE STYLES, SELECTION & PROPER FIT

Bicycles come in a number of different models and styles designed to meet various needs and pocketbooks.

Brake and gear systems, equipment and accessories vary depending on the type of bicycle and the desires of the cyclist. In the adult cycling society the middleweight and lightweight bicycles are the most common, but other models are available and appear on the scene. Included are the adult tricycle, tandem bikes, uni-cycle and track bicycles.

The Middleweight Bicycle

The middleweight bicycle, a very popular model, is probably the most common in the single-speed class. This is a rugged, durable bike, ideal for learning how to drive. Its weight normally ranges between 50 and 70 pounds, depending upon the type of frame and tires used. Frame sizes come in 17, 19, 21, and 23 inches in order to fit a wide range of riders. Wheel sizes may vary from 16 to 26 inches. The middleweight has large, low-pressure tires with inner tubes that are normally inflated to approximately 30 pounds of pressure. This contributes to the middleweight's comfortable ride.

The middleweight is normally equipped with coaster brakes, also known as foot brakes. This braking system has only a rearwheel brake, activated by reversing the normal direction of the pedals. This is probably the best braking system for the novice bicyclist.

The middleweight bike: rugged, durable, ideal for the novice.

The Lightweight Bicycle

Lightweight bicycles are designed for drivers who want to go faster and farther. Many have downturned, racing style handlebars. Narrow, high-pressure tires are standard equipment.

The two basic styles are the three-speed recreational bicycle and the five- or ten-speed touring bicycle. These multiple-gear bicycles allow the cyclist to select various gear ratios for faster speeds and easier handling on hills and difficult terrain.

Three-speed: allows driver to adjust to specific conditions.

The Three-Speed Recreational Bicycle

Weighing between 36 and 40 pounds, the three-speed recreational bicycle is a tough, sturdy, and yet easy-to-drive bike. Learning to drive this bike requires a minimum amount of time and instruction.

A number of different frame sizes and wheel sizes are available in order to fit just about everybody. In addition, the bicyclist has a choice between caliper hand brakes for both wheels or a caliper brake for the front wheel and a coaster brake for the back. He can also choose upright or racing-style handlebars.

The three-speed gear mechanism is enclosed in the rear and allows the driver to adjust to specific conditions. For example, the lowest gear is used for pedaling uphill or into strong headwinds. The highest gear is used for pedaling downhill or with the wind.

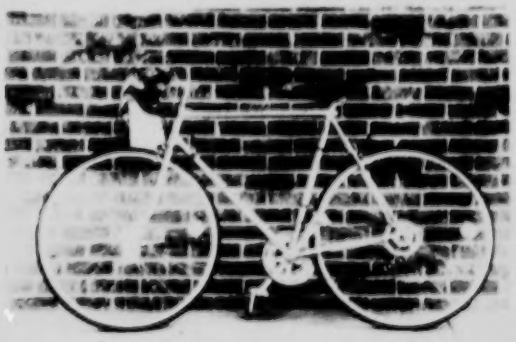
When a bicycle is equipped with caliper hand brakes, both brake levers should be operated with equal pressure. This will cause both the front and the rear wheel to stop smoothly. Some experts advise that the rear brake should be initiated slightly before the front brake, and many bicycle mechanics adjust these brakes so that more pressure is applied to the rear wheel during braking.

It is important that the left hand be free for hand signals, so the rear brake should be activated by the right-hand brake lever. Applying pressure to the front brake first should always be avoided, especially on wet or slippery surfaces or on gravel. Stopping the front wheel alone could cause the bicyclist to lose control of the bike and pitch forward.

The Five- or Ten-Speed Touring Bicycle

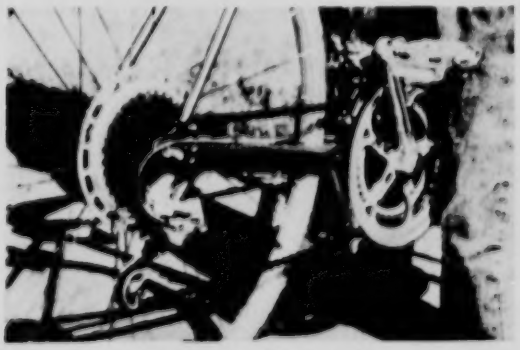
This bicycle is equipped with derailleur gears that help the bicycle drive farther and faster with less effort. A proper understanding of derailleur gears and their function is necessary for optimal performance.

A derailleur moves the chain from one spoke to another. A five-speed bicycle has a single chain wheel and a cluster of five freewheel sprockets in the rear. The gears are selected with a shift lever on the front of the bicycle frame. A ten-speed bicycle has two front chain wheels, five freewheel sprockets in the rear, and a front and rear derailleur. Two shift levers permit the proper gear selection. The right lever shifts the chain on the rear sprockets, while the left lever shifts it on the chain wheel. During shifting, the bicycle wheels and pedals must be moving (except on some newer bikes equipped with a front freewheel system). The pressure against the pedals when gears are changed should be reduced.



Ten-speed: sophisticated, high-performance touring bicycle.

The more sophisticated derailleur-equipped bicycles are made of special lightweight alloys and may weigh less than 20 pounds. Most derailleur high-performance bicycles have front and rear caliper brakes, taped drop handlebars, and pedals with toe clips and straps. These pedals, along with the other more sophisticated features of the ten-speed bicycle, require skill and experience. Therefore, they are not recommended for novice or beginning bicyclists.



The derailleur "derails" the chain, moving it from one sprocket to another for different gear ratios.

The Track Bicycle

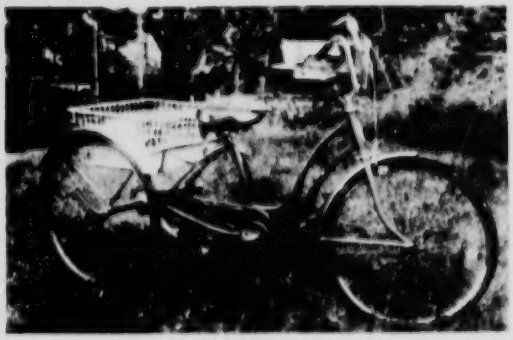
Feather-light, handcrafted, and tailored to fit the owner, the track bike is the elite of racing bicycles. Because it is custom made, the track bike allows the bicyclist to achieve the most efficient forward motion from each thrust of the pedals. The track bike is designed for quick acceleration and easy handling. It is intended for use on a smooth track where conditions are constant.

A track bike has a single, fixed gear that is predetermined by the racer. The frame is made of very lightweight alloys, giving the bike a total weight of only 14 to 18 pounds. The wheelbase is somewhat shorter than that of a conventional bike.

Track bikes have no brakes. Drivers stop them by counter pedaling and placing a gloved hand on the front tire. This unique braking technique is not recommended under any other bicycling conditions.

The Adult Tricycle

The adult tricycle is designed for steadiness and the ability to carry objects two-wheeled bicycles cannot. Adult tricycles are frequently used by older adults and the handicapped. The adult tricycle is normally equipped with a coaster brake and often caliper brakes for the front wheel. The front wheel usually has a "park" setting to prevent rolling away. A basket is typically mounted between the two rear wheels, making these bikes quite useful for shopping and running errands.

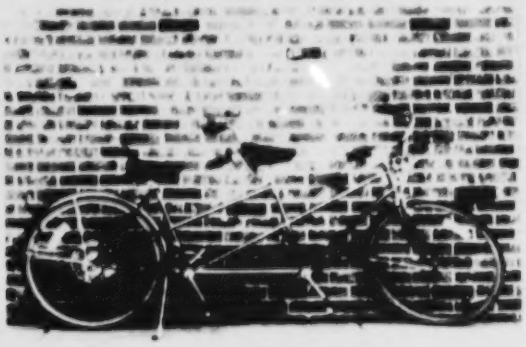


Adult tricycle: steady friend to the elderly and handicapped.

The Tandem Bicycle

A tandem bicycle is a bicycle built for two. Tandem bicycles are becoming more popular because they allow bicyclists of different strengths and endurances to travel long distances together.

Like most other bicycles, tandem bikes come in different weights and sizes and offer a variety of braking systems as well as gears. However, tandem bikes require a pedal rhythm and technique different from that required by other bikes. Steering is particularly difficult in short-radius turns at slow speed. Nonetheless, the tandem bike offers a unique form of bicycling enjoyment, especially when both partners are experienced cyclists.



The tandem: requires both a pedal rhythm and a different cycling technique.

The Uni-Cycle

Unicycling offers a different experience for those with skill in riding and balance. Unicycling is a little more difficult than regular cycling but filled with rich rewards for those who master the art.

BIKE SELECTION

The first step in bike selection is to decide on the type. There are many things to be considered. How much usage and for what purpose the bike will be used is a major consideration. How much the buyer is willing to spend and the kind of maintenance and repair work the owner can do will be a determining factor.

A middleweight bicycle is best for the novice that will drive for short commuter trips, shopping nearby, recreational types of short duration, and one that gives stability and little maintenance difficulties. The lightweight bicycle is best for racing, longer trips, and recreational cycling or touring where variable speeds and easier riding over various parts of the country are desired.

Even when the particular style has been selected, there are often different models available. The lightweight 3-speed and 10-speed are the most popular bicycles today. The 10-speed is usually a little lighter than the 3-speed which makes it popular for cross-country touring.

On the other hand, the 10-speed is more delicate and requires a higher level of maintenance and riding skill.

Another consideration is the type of handlebars desired. "Drop" or "reverse bend" handlebars (sometimes called racing bars and virtually standard equipment on lightweight 10-speeds) provide a wide variety of driving positions, but generally require the driver to assume a bent-forward position. The extreme crouch position used when holding the drop portion of the handlebars provides optimum muscular efficiency and minimizes wind resistance. Regular or "touring" handlebars permit a more upright driving position and offer a better view of traffic. Although the drop handlebars appear awkward and uncomfortable, they are vastly superior for sustained driving because they offer a wide variety of hand/arm positions and help minimize wind resistance, which increases geometrically with speed.

Buying an Unassembled Bicycle

Anyone buying an unassembled bicycle should be familiar with bicycles and know how to put one together. Those with multi-speed gears can be particularly difficult. Inexperienced buyers should ask the dealer to do the job or find out where it can be done.

For a number of reasons it is often best to select a bicycle at a local bicycle shop. The owner and his staff know how to set up a bicycle and make repairs. The chances of getting a bicycle that's in perfect working order are good, and there's a trained mechanic on hand to fix it should something go wrong. Many small adjustments and repairs are also covered under warranty with these dealerships.

Regardless of the style and model selected, the buyer should make sure that the bicycle fits properly. A bicycle that is too large or too small is not only uncomfortable, but may also be dangerous.

PROPER FIT

Selecting the Right Size Frame

Perhaps the most important step is the selection of the proper frame size. The frame size is measured from the point where the seat post enters the frame to the center of the crank housing. Selection of the proper size bike is based on the length of the individual's leg. In stocking feet or flat-heeled shoes, the buyer should measure the distance from the crotch to the floor. Then he should pick the frame size that comes closest to this measurement.

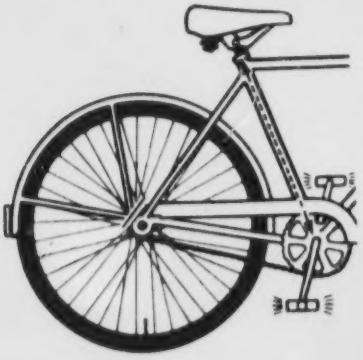


Figure One Dotted line (seat post to crank housing) indicates frame size

Fitting the Bike to the Rider

The proper fit of bicyclist to cyclist is a primary safety concern. A bike that is too large or too small interferes with proper control, and has an adverse effect on the cyclist's use of his muscles in driving, turning or stopping his bike.

A saddle that is too low will be uncomfortable and cause the cyclist to tire easily. This happens because the muscles of the legs cannot be used properly. A saddle that is too high won't allow the legs to act as "shock absorbers" by bearing some of the body weight when roads are bumpy.

The correctly adjusted bike may feel strange to the cyclist at first. Instructors must be firm in insisting on a correctly adjusted bicycle with the saddle at the proper height.

Check the following items carefully, making adjustments as necessary. Hold the bicycle upright. The driver sits normally on the saddle with the pedal at its lowest position and the rider's heel on the pedal. The cyclist grasps the handlebars as though riding.

(1) The saddle top should be parallel with the ground.
(2) The cyclist's leg should be fully extended and straight, but without stretching or moving in the saddle.
(3) The upper part of his body should be inclined forward.
(4) Handlebar grips should be approximately the same height as the saddle.
(5) Arms should be neither stretched nor cramped, and handlebar grips should be tilted just a few degrees forward, or up, from parallel with the ground.

Make sure the rider can comfortably straddle the frame with both feet on the ground. Adjustments can be made to the saddle by moving it backward or forward, and by tilting it up or down. The handlebar stem and seat post can be raised or lowered. Leave at least three inches of seat post and handlebar stem imbedded in the frame. If, after making all adjustments, the rider still does not fit the bicycle, this is an unsafe condition.

Remember that too large a bicycle is fatiguing and difficult to control. Too small a bike results in the cyclist's knees and elbows interfering with steering. This test is particularly important with younger riders who have a tendency to grow several inches a season.

Lightweight bicycles such as 3-, 5- or 10-speeds have either 26-inch or 27-inch diameter wheels. Frame sizes of these bicycles are available in sizes ranging from 17 to 26 inches to fit leg lengths of different sizes of people (Table 1).

Wheel Size	Leg Length	Frame Size
26 in.	26–30 in.	17 in.
	28–31 in.	19 in.
27 in.	29–32 in.	20 in.
	30–33 in.	21 in.
	31–34 in.	22 in.
	32–35 in.	23 in.
	33–36 in.	24 in.
	34–37 in.	25 in.
	35–38 in.	26 in.

You should select a lightweight bicycle with the largest frame size that you can stand over comfortably with both feet on the ground, as shown in Figure 2.

Leg length is determined by measuring the distance from crotch to floor while standing in stocking feet.

Even though your bicycle may be correctly sized it still needs to be adjusted to fit your body while you are driving.

Figure 2.

Rider MUST be able to straddle bicycle when standing

The saddle and the handlebars are the two parts you will need to adjust.

Correct Seat and Handlebar Adjustment

Middle and lightweight bicycles have saddle adjustments for levelness, fore-aft position, and height length. (Figure 3.)

Figure 3. Correct position, middle and lightweight bicycles.

Saddle Adjustment Procedure

(1) Level the saddle on a lightweight bicycle by first loosening the saddle clamp. (Figure 4.)

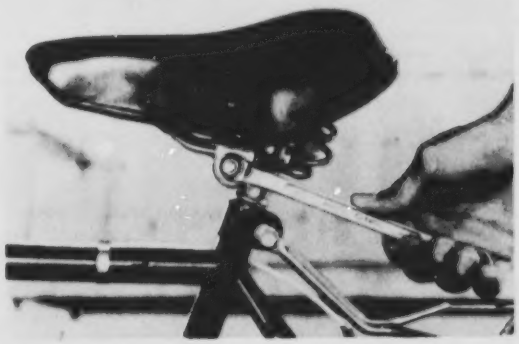


Figure 4. Loosen saddle clamp.

(2) Move the saddle unit until it is level or parallel with the ground.

(3) Tighten the saddle clamp nut.

(4) Adjust the saddle for height–to fit your leg length. Loosen the saddle post clamp. (Figure 5.)

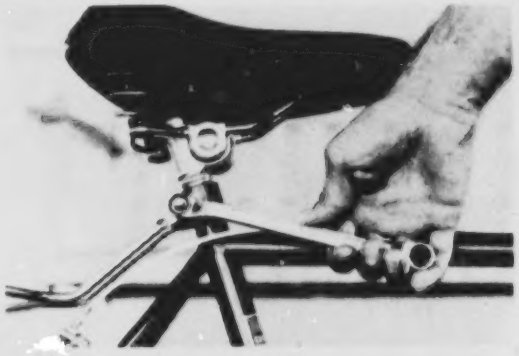


Figure 5. Loosen saddle post clamp.

(5) Twist and push or pull the saddle to the correct position. (Figure 6.)

Figure 6. Adjusting the saddle position.

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(6) Leave at least two inches of the saddle post in the saddle mast (Figure 7). Many bicycles have a mark on the saddle post to show the safe maximum height of the saddle. Do not extend the post beyond this mark. The post or mast may break if you do.
(7) Tighten the saddle post clamp.
(8) Adjust the fore-aft position of the saddle by loosening a third nut under the saddle pad (Figure 8). The front of the saddle should be moved so it is two inches behind the crank bearings (Figure 9).

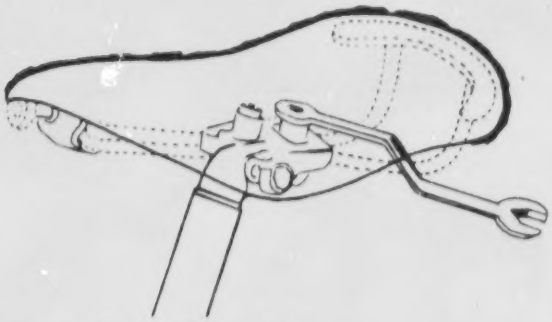


Figure 8. Fore-aft adjustment nut.

On lightweight bicycles with racing handlebars the saddle adjustment may be determined by measuring the distance from the end of the elbow to the fingertip. Position the front of the saddle so it is the same distance from the center of the handlebars (Figure 10).

(9) Tighten the adjusting nut. Drive the bicycle to test the saddle fit. You may need to do some readjustment to improve fit.

When you are finished adjusting the saddle check the nuts for tightness. A saddle that comes loose while you are driving is troublesome and hazardous.

Handlebar Adjustment

There are two basic types of handlebars: the upright or flat handlebars and the dropped or turned-down type.

Proper adjustment for regular upright handlebars should:

- cause the upper part of the body to be inclined slightly forward,
- find the hands falling naturally to the handlebar grips without stretching,
- have the grips pointed slightly downward, at right angles to the handlebar stem and about the same height as the seat.

The dropped or turned-down handlebars used primarily on 10-speed derailleur lightweights are preferred by most experienced cyclists for short and long distance touring. As body weight is distributed more evenly between saddle and handlebars, they are more comfortable and less tiring.

Figure 7. Mark on saddle post shows highest saddle adjustment.

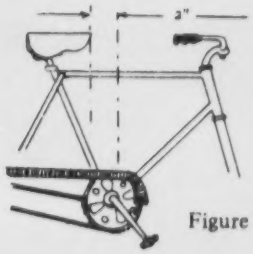


Figure 9. Fore-aft adjustment.

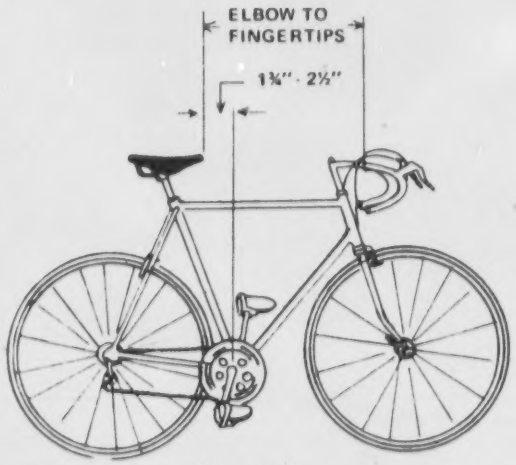


Figure 10. Correct saddle position.

Handlebar grips should be approximately the same height as the saddle.

The top of the handlebar stem on lightweight bicycles should be in line with the top of the saddle (Figure 11).

Grips on touring handlebars are probably most comfortable if they are pointed slightly downward.

The grips on racing handlebars are best positioned so they point down at a 10 to 15 degree angle.

When you are seated on the bicycle with your hand on the handlebars, your eyes should be directly over the center of the handlebars (Figure 12).

Handlebar stems with a different length of "reach" are available if the reach on your bicycle is incorrect (Figure 13).

You may wish to ask a bicycle dealer to help you adjust the handlebars if you have a lightweight bike with racing handlebars. How to adjust the handlebars:

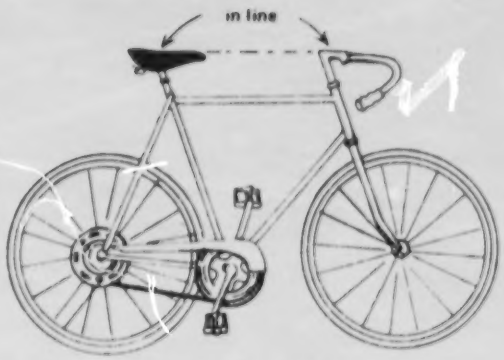


Figure 11. Saddle, handlebar lineup.

Figure 12. Eyes centered over handlebars.

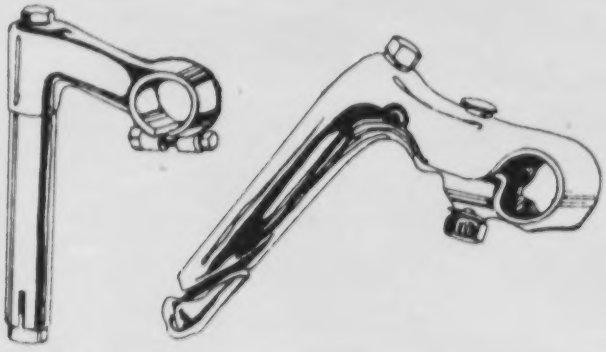
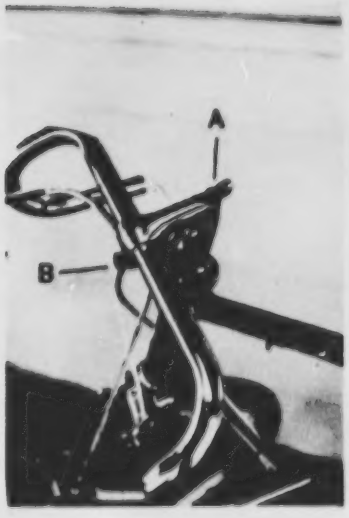


Figure 13. Different "reach" handlebars available.

To raise or lower your handlebars, loosen bolt 'A' two turns and give it a firm but gentle tap downward, protecting head of bolt with piece of wood. This releases the expander cone/wedge and allows the stem to be moved. When the handlebars are set at required height, tighten bolt 'A' securely.

Caution–Overtightening the stem locking bolt may cause damage and impair the smooth steering of your bicycle.



IMPORTANT WARNING

Your bicycle must never be ridden with the handlebar stem raised beyond the 'limit' mark on the stem. This is to ensure that the handlebar stem is retained securely in the fork column.

DO NOT ADJUST BEYOND THIS HEIGHT

If the angle of the handlebars requires adjustment, loosen nut 'B' and adjust bars to the desired angle. Tighten nut 'B' securely.

After adjustment check that handlebar has been tightened sufficiently. Hold the front wheel steady and attempt to twist the handlebar. If you can, tighten the locking bolt until no further twisting occurs.

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SELECTING A SAFER BIKE

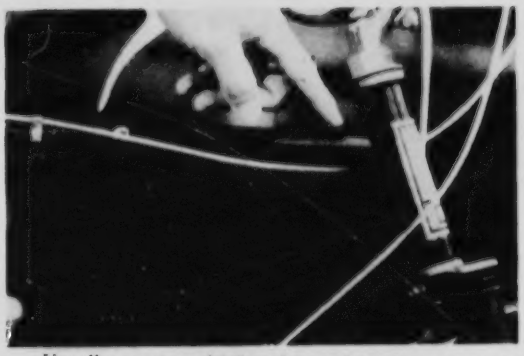
Faulty Brakes Can Cause Accidents– Always road test a bike before you buy. There is no other way to be sure the brakes are going to give you quick, smooth, easy stops. If you are buying a bike with handbrakes, be sure the levers can be moved easily. This is particularly important for children or others with small hands. If the bicycle has extensions on the handbrakes, they should give a full braking effect before the hand levers touch the handlebars.

Look Closely At All Potentially Sharp Edges– If you have a bike with sharp edges, file them down and cover them with heavy, protective tape. If this is done neatly, it will not detract from the appearance of the bike.

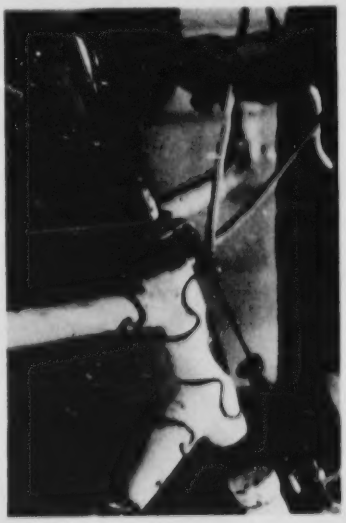
Look At All Parts of the Frame– Improperly welded joints or a fracture caused by improper handling in the manufacturing or shipping can result in a weak frame. Even a hairline crack can cause metal to break under a sudden jolt.

Feel the frame joints for smoothness. The mark of a good factor craftsman is smooth lugged joints, not those rough or bubbled to the touch. If these are found, move on to another bike; if craftsmanship is lacking at this stage, who knows where further discrepancy will be found?

Check the wheels for out-of-roundness by lifting up the frame and spinning them. They should revolve at an equal distance from the caliper brakes. While you're at it, check and see if the cones are loose by setting the bike down, grabbing the handlebars and trying to wiggle the wheel. If it does, the cones need to be tightened, which doesn't disqualify the bike from purchase.

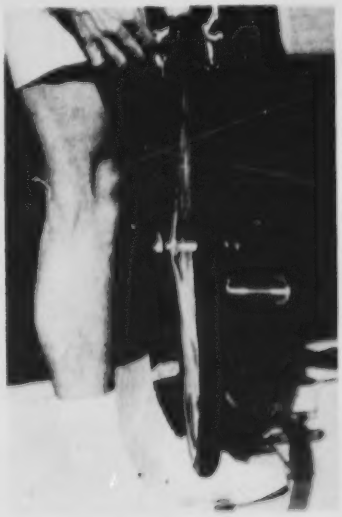


Usually one-speed bikes do not have lugged joints, but are welded and have smooth ones.



If the bike does have lugs, check for roughness and overall finish. A good craftsman will have smooth lugs with eye-pleasing quality. If not, maybe the frame has other flaws.

Discover if the cones are loose by trying to wiggle the wheel while holding the bars.



Demonstrate the proper way to check wheel alignment by picking up the bike and spinning the wheel. If it does not spin evenly or wobbles, the rim may be out of round.

Check Front Forks

The next logical area of scrutiny is the front fork. It is possible to become bogged-down with technical data in checking such things as angles and the effect they have on performance, but most riders don't take the time or actually have the necessary background to fully appreciate these factors.

Some simple checks that should assure a smooth riding bicycle are:

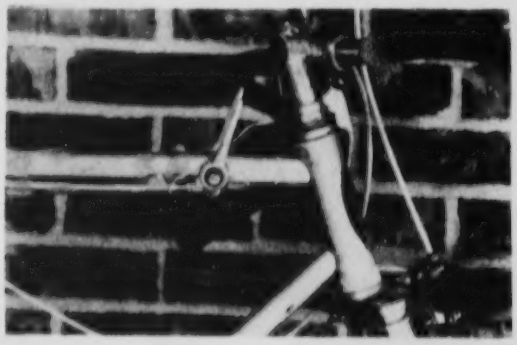
First, check the length of the front forks. They should be equal in length and only infrequently will they differ. Should they, however, move on to another model.

Check alignment of the forks. They should be equally spaced on either side of the front wheel. By looking head-on at the frame from the front, the prospective buyer should be able to see only one set of tubing, the others being in complete alignment. If not, the frame probably is not sound.

By looking down the frame from the front, all tubes should appear as one. If not, the frame is not in proper alignment. Don't buy it!

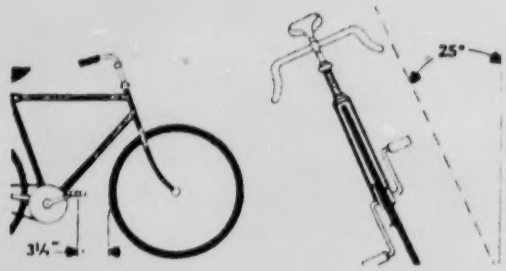
Watch Out For Protrusions Which Could Cause Injury to the Thigh or Groin

There should be no protrusions between the bicycle seat and handlebar stem that extend more than 3½ inches to the rear of the handlebar stem.



Check for Two Types of Clearances

There should be at least 3½ inches of clearance between the pedal and the front fender or tire. This is important to prevent the toe of a shoe from getting caught between the frame and the front wheel. The pedals must not touch the ground when the bike is tilted at least 25 degrees on a turn. Otherwise a pedal could catch the ground on a turn and cause a spill.

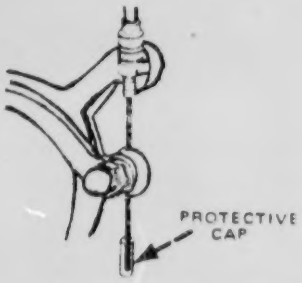


U.S. CONSUMER PRODUCT SAFETY COMMISSION BICYCLE REGULATIONS

The U.S. Consumer Product Safety Commission has published federal safety regulations for bicycles to help insure safer performance and integrity.

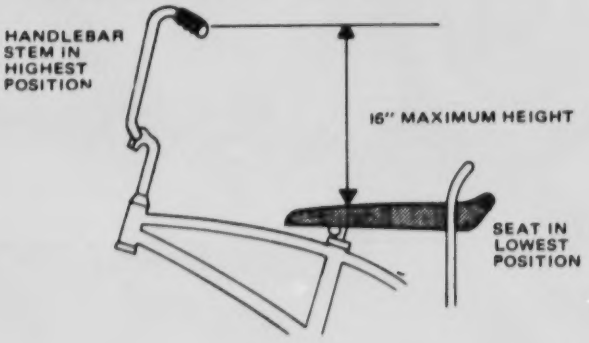
Some major provisions of the bicycle regulations are as follows:

(1) *No sharp edges and protrusions*—Sharp edges are prohibited, as are protrusions of specified dimensions. Certain exposed protrusions, such as control cable ends, must be covered with protective caps. This should help reduce the large number of cuts and punctures which presently occur in bicycle accidents.

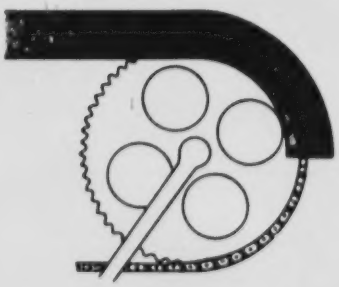


(2) *Good brakes*—The braking requirements depend upon the speed capability of each bicycle. Those bicycles capable of speeds equal to or greater than 15 miles per hour (many of these bicycles have handbrakes) must be able to stop in 15 feet from 15 miles per hour. Brake performance requirements for bicycles equipped only with handbrakes became effective May 11, 1976. Those bicycles capable of only slower speeds (many of these have footbrakes) must be able to stop in 15 feet from 10 miles per hour. Brake performance requirements for bicycles equipped only with footbrakes, or with a combination of footbrakes and handbrakes, became effective November 13, 1976.

(3) *Strong handlebars and handlebar stems*–The handlebar and stem must not break when subjected to specified strength tests. The handlebar must be designed and positioned to allow comfortable and safe control of the bicycle. Handlebars must be symmetrically located and must be no more than 16 inches above the seat surface, as shown in the diagram.



(4) *Protective guards*–Single gear ratio bicycles must be equipped with chain guards meeting specific requirements to prevent entanglement of hands, feet or clothing with the chain or sprocket. Guards are not required where the chain can be pedaled in reverse. Derailleurs, the mechanisms that produce gear shifting in multi-sprocket bicycles, must be guarded to prevent the drive chain from interfering with rotation of the wheel because of improper adjustments or damage to the derailleur.



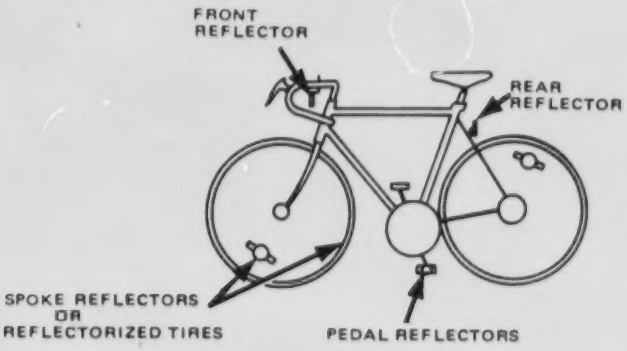
(5) *Strong tires and firmly attached wheels*–The tires must not blow off the rim when the tire is inflated to 110% of maximum recommended pressure. (Tubular sew-up tires, nonpneumatic tires, and nonmolded wired-on tires are exempt from this requirement.) There must be no missing or loose spokes. The wheels must be aligned, "trued," so that there is at least one-sixteenth inch clearance between the tire and fork or any part of the bicycle frame. This one-sixteenth inch clearance will help assure good caliper brake performance. The hubs must be securely locked to the bicycle frame, and the front hub must have a safety device that will hold the wheel in place if the front axle nuts loosen. These requirements should reduce the number of injuries due to wheel separations.

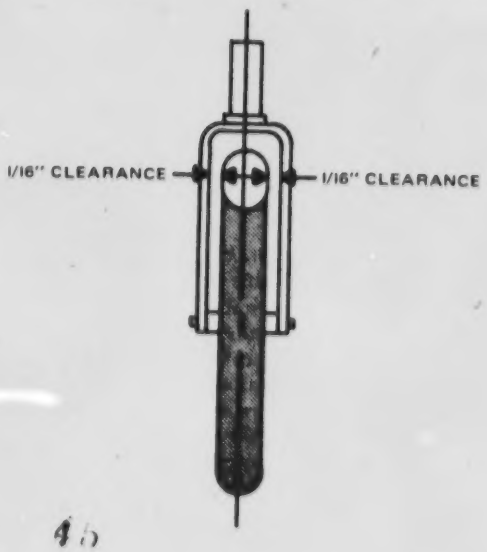
(6) *Strong forks and frames, and firmly-attached seats*–The front fork and frame must meet specified strength requirements. The seat must be firmly attached to the seat post tube so that it will not move or break under normal riding conditions, and it must not have any part or support over 5 inches above the top of the seat surface. This is to allow a rider to dismount by swinging a leg over the seat and rear wheel.

(7) *Pedals*–Treads must be an integral part of the pedal construction, unless the pedals are intended for use only with tow clips (toe clips must be attached to these). Ground and toe clearance requirements for pedals are specified in the regulations.

(8) *Strong drive chain*–The drive chain must pass a strength test specified in the regulations, so that it won't break under normal riding conditions.

(9) *Front, rear, side, and pedal reflectors*–All bicycles, except sidewalk bicycles, must be equipped with reflectors on the front, back, pedals, and sides. The regulations allow the bicycle to be equipped with either reflectorized tires or with reflectors mounted on the wheel spokes. These measures are intended to provide a motorist with a unique pattern of reflective devices which distinctively identify a bicycle when viewed at night from any angle.





(10) *Easy assembly and labeling*–Each bicycle must have an Instruction Manual attached to the frame or included within the package unit. If less than fully assembled, the bicycle must have instructions listing the tools necessary for proper assembly and adjustment, and illustrating the correct leg-length measurement of the rider. The bicycle instructions should be simple enough to enable an average person to properly assemble the bicycle. Bicycles must be labeled to indicate that they comply with the regulations. In addition, bicycles must be permanently marked or labeled to identify the manufacturer or private labeler and date coded in such a way that the month and year of manufacture can be determined by the manufacturer.

(11) *Other regulation requirements*–All bicycles, other than sidewalk bicycles, must pass a road test designed to simulate a bicycle ridden over a rough road. This test should expose potential problems with the bicycle.

The above provisions are summaries of the bicycle regulations determined by the U.S. Consumer Product Safety Commission. To obtain a copy of the complete bicycle regulations, or information materials on bicycle safety, or to report a product hazard or a product-related injury, write to the U.S. Consumer Product Safety Commission, Washington, D.C. 20207. In the continental United States, call the toll-free hotline 800-638-2666.

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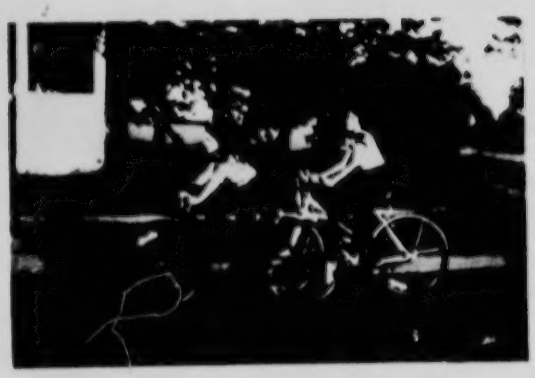
CHAPTER 7

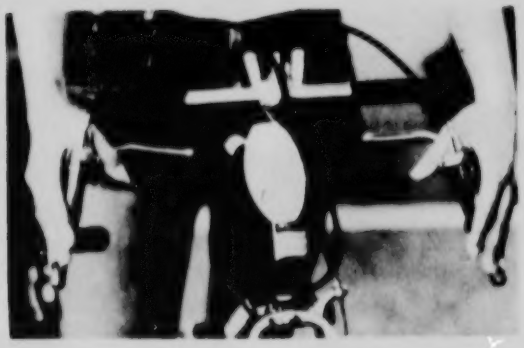
RIDING TECHNIQUE & EVASIVE ACTION

Basic Posture and Pedaling Technique

Once the bicycle is adjusted to the proper fit of the individual, the arms will be as wide as the shoulders extended comfortably forward, the ball of the foot on the pedal, the back inclined at an angle of 40 to 45 degrees from the horizontal with the hands placed on the "dropped" handlebar, and the leg will have a slight bend.

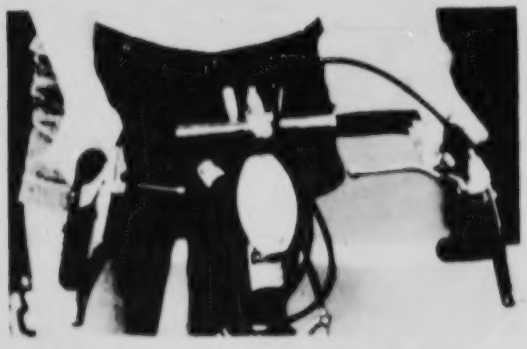
The slower cyclist may prefer a more upright position with saddle and handlebars far back. The faster cyclist must lower his position to reduce wind resistance, so his saddle is farther forward and his handlebars forward and down. © JF



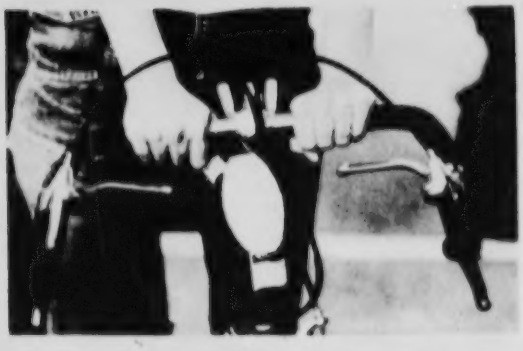


Normal riding position. Hands are over brake lever hoods, fingers are on brake levers.

Hands on bottom. This streamlined body position reduces wind resistance.



Hands on bend. This position is used to relieve muscle tension.

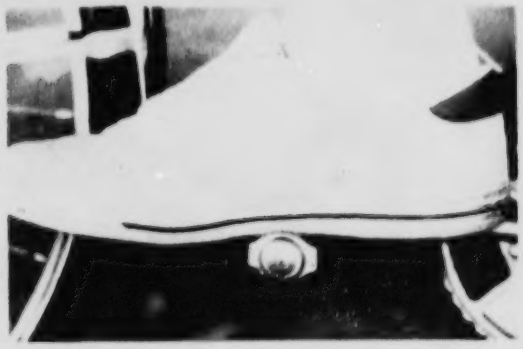


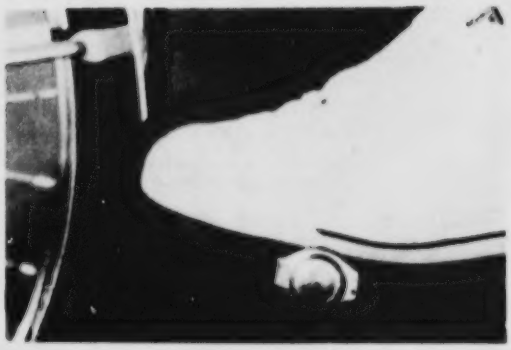
Hands on top center. Used to get greater power from back muscles for hill climbing.

Placing the arch of the foot over the pedals cuts riding time through efficiency loss. The clips are designed so that only the toes will fit into them, resulting in the ball of the foot being placed directly over the pedal.

If the bicycle is equipped with toe clips, getting the feet into the pedals while keeping the machine moving should be mastered before hitting a stop sign in traffic and trying to practice with cars zipping past.

You can practice this while stationary by holding yourself upright by grasping a tree or light pole and practicing the engagement of the toe clips with both feet.





Improper foot position is shown at top left, with arch of the foot over pedal. The ball of the foot (top right) is correct. Toe clips (right) assure this position.

From a standing start, getting foot in toe clip is hard and should be practiced away from traffic. In but a few tries, the cyclist can master the trick.

The proper way is to revolve the pedals until the right-hand one is uppermost. Get the foot properly into this clip and strap, then push off with the left leg, pumping the right pedal downwards at the same time.

A note of caution: As the bicycle will be moving slowly, don't endeavor to turn sharply in either direction, as the bike probably will fall over in the chosen direction.

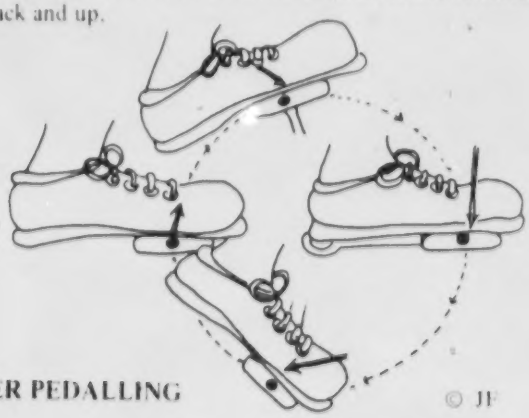
Photo sequence below depicts proper starting form: Pushing off and down on right pedal (far left), raising left foot as pedal comes to top of stroke (center), then pushing left pedal downwards. It is deceptively easy.

Ankle Technique

While pedaling, most people tend to apply pressure on the downward strokes, while unconsciously relaxing that leg on the upstroke, when the other leg is applying downward pressure. In itself, this act results in much efficiency loss and cyclists tend to tire much more rapidly than if they applied pressure on the pedal through its entire revolution. The toe clips aid in this effort, for the rider can exert a force against them and thereby help bring the pedal around.

The most important first step to cycle efficiency is to "ankle" correctly. Ankling simply means efficient pedaling. If your bicycle is a conventional three-speed with rubber pedals, start by cycling only with the ball of the foot. When using the rat-trap, toe clips, they keep the ball of the foot on the pedal correctly.

Correct ankling techniques involve ankle positions with the toe pointing slightly upward at top of stroke to push pedal forward and down, downward at the bottom of stroke to force pedal back and up.



PROPER PEDALLING © JF

Stopping

Slow down with the brakes. Set one pedal high, the other low. Transfer your weight to the low pedal, sliding forward off the saddle and stand up. Take your foot off the high pedal and touch the ground as you stop. In preparation for moving off again, backpedal until your pedal foot is forward and high again. © JF

In braking use both levers equally. Tighten down on the levers until you are slowing down at the rate desired. Don't let it skid- release both levers a little bit until the wheel resumes turning to prevent a skid. © JF

Shifting & Gear Selection

A surprising number of ten-speed bicycle owners miss advantages that multiple gears offer because they don't know which gear they are using—or whether it's the best one available.

The gearing mechanisms on a 5, 10, or 15-speed bicycle appear to be complicated at first and truly take some getting used to. Unlike an automobile with a manual shifting stick, there are no specific notches that the shifters engage, which is why shifting takes practice.

The Shifters

There are two shift levers. The one on the left controls the chain wheel shifter . . . the one on the right controls the free (rear) wheel shifter. Both operate with finger tip control. Shift firmly and smoothly. The left lever controls only two gear positions and should be moved either all the way forward or all the way back. On the 15-speed it controls three positions.

The right level controls several gear positions and they are felt rather than selected by a positive position. (When changing from one gear to another, if the chain clatters this can be corrected by a slight additional movement of the lever.) At first this may seem difficult, but with practice it will become automatic. The system was designed for safety. You can keep your eyes on the road while shifting.

Derailleur Gear

It is so named because it works on a derailling principle of moving the chain from one sprocket to another.

Upon making the first shift, the novice rider can expect to hear a curious variety of sounds, all of them signalling that the shift was made incorrectly. When a shift is made correctly, there will be no sound other than the usual tick-tick-tick of the bicycle in operation. However, if a pinging noise is heard, this generally signals that the rear derailleur is going to shift to a lower gear than you had intended. This is caused by moving the right-hand shifter too far rearward. To correct the problem, simply move the right-hand shifter forward slightly, which will guide the derailleur into the right gear.

Along the same lines, should a whirring sound or loud click be heard frequently upon making a shift, this denotes that the rear derailleur is about to shift to a higher gear than you intended. Simply easing the right-hand shifter rearward slightly should guide the chain into the appropriate gearing ratio.

This same problem can occur when using the front derailleur, signalled by a high-pitched rubbing sound when the outside edge of the changer is touching the chain, whereas a low-toned rubbing sound is caused by the chain hitting the inside edge of the derailleur. In the former case, a simple remedy is to move the left-hand shifter rearward slightly, until the sound disappears. The latter case calls for the reverse operation, that of moving the same shifter ahead slightly. Some bicycles have this gearing system reversed, which will necessitate your reversal of these correcting operations. Be sure to check the pattern of your bicycle.

It should be noted that, on this type of bicycle with a freewheeling capacity, the gears cannot be changed unless the bicycle is moving forward, the chain revolving, without any tension applied. Once speed has been attained and a change is desirable simply ease off on the pedaling pressure while keeping the chain rotating—then slip into the gear desired.

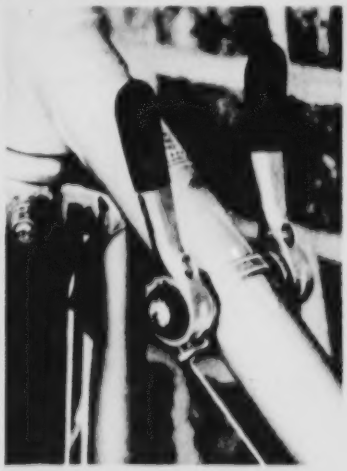
The smallest sprocket on the free wheel (when coupled with the largest sprocket on the chain wheel) is the highest gear.

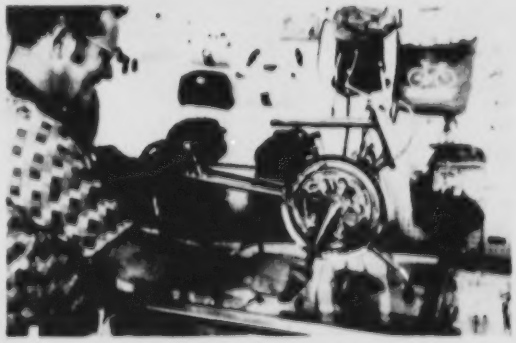
The wide range of gears allows you to combat all prevailing conditions while pedaling at the comfortable rate of 60 revolutions per minute. The rate and gear ratios have been scientifically determined so all you need to do is select the gear that suits the road conditions.

Should you wish to shift to a lower gear while negotiating a hill, you will have to pedal a little harder to pick up additional speed, then let the pressure off just enough to make the change, and keep pedaling up the incline.

To change gears, the bicycle must be moving with the chain under no tension. The shifter then is moved to the desired gear while the rider maintains a steady pedaling rhythm.

Shifters are found in varying locations on 10-speeds, most placed as these, below. These have plastic wing nuts and covers, which easily loosen and look cheesey.





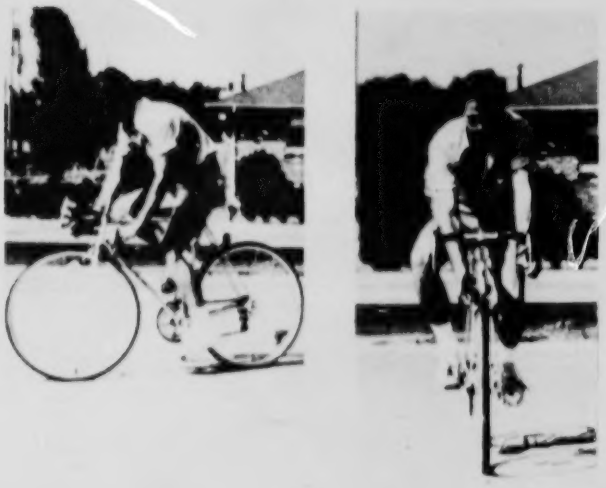
Derailleur operation is better understood after viewing demonstrator.

Derailleur Gearing

Derailleur gearing provides a cluster of two to seven sprockets located on the rear hub, a group of one, two or three front chain wheels attached to the crank, and shifting mechanisms that will shift the chain, while in motion, to any desired combination of front and rear sprockets.

As the chain is shifted toward the center line of the bicycle, the bicycle is geared lower, allowing easier pedaling for conquering hills and winds. Conversely, as the chain is shifted toward the outside, pedalling becomes harder, but more distance is covered for each pedal revolution.

The derailleur provides the ability to shift gears without stopping the foot motion, combined with a large selection of gear ratios. This allows the cyclist to select the one gear most efficient for each combination of load, gradient, wind, cyclist strength and fatigue. It avoids breaking the rhythm of motion while changes in gear are being made.



To change gears, bicycle must be moving with chain under no tension. The shifter then is moved to the desired gear while the rider maintains a steady pedaling rhythm.

Getting Ready to Drive With Derailleurs

One big advantage of the derailleur shifting mechanism is the ability to "see" exactly what is happening. Adjustments are therefore apparent when the operation is observed. The instruction manuals provided with your bicycle should be read carefully before making adjustments.

Before riding your derailleur bicycle for the first time, ask your dealer to show you the operation of the derailleur. If this cannot be done, either hang the bicycle from a ceiling or turn it upside down and while rotating the pedals operate the gear shift levers, noting their operation.

If the derailleur does not operate properly, notify your dealer immediately or consult your Owner's Manual.

Make a table of the "gear" attained with each position of the shift lever. Glue it to your handlebar stem. It will help you "plan" your shifting and will make it more interesting. It will help you to determine what modifications may be helpful.

Certain basic principles of derailleur gear shifting can be listed to guide the new user—both to make more effective use of his gears and to avoid damage to them.

Shifting the Derailleur

Principle No. 1:

It is necessary for the chain to be carried over to the next sprocket, pick up on the teeth and seat itself.

(a) The chain, therefore, must be moving forward while the shift is taking place, yet with no pressure on the pedals. Relax pedal pressure when shifting, but do not stop or slow the feet. Turning the feet backward while moving the lever can result in severe distortion of the shifter.

(b) The shift-lever should be moved firmly and rapidly to the desired position, but only when the pedals are being turned at good speed in the forward direction. To do otherwise can result in overstrain or bending of chain and shift mechanism. After completing a shift, listen for any sound or rubbing or clatter. If this is noted, the shifting cage is not properly aligned. Adjust the lever slightly, back or forward, until the gear operates noiselessly. In some cases it may be necessary to move the opposite lever.

Principle No. 2

The forward speed of a bicycle diminishes when no pressure is applied to the pedals (except downhill).

(a) Therefore, to accomplish a successful shift without applying pedal pressure until the shift is completed, ample forward speed is needed. Notice the terrain ahead. Learn to anticipate the speed drop to be expected. Start the shift with ample speed, and shift quickly.

(b) DO NOT FORCE the shifter. If your speed is too slow, apply power, speed up and try again. If the hill is too steep to get speed, struggle in the too-high gear and get off. Walking up a bad hill is no disgrace.

Your First Drive on Your Lightweight Derailleur Bicycle

Your lightweight bicycle is more sensitive in handling than its heavier cousins. Avoid a tendency to over-control and to wobble severely. Anticipate this and you will quickly conquer it and will soon appreciate firm, easy handling.

After gaining firm control, try moving your hand to the gear shift lever position, grasping the lever end gently. When you can do this with confidence, you are ready to try shifting gears. Shift from top to bottom, both front and rear, one step at a time, then several steps at a time, until you get the "feel" of the gears, and the lever positions needed for any desired combination.

A shift should be made with exact timing–just at the point that increased or decreased resistance would cause the foot speed to change. If properly done, a gear is shifted with no noise or clatter except a pleasant "plunk" as the chain seats. There will be no noticeable change in foot speed when gears are shifted at the proper time. Use this as a test of your developing skill, but have patience–IT IS A SKILL.

If you wait until increased resistance has slowed your pace, the change in foot speed upon shifting will destroy your rhythm and increase fatigue.

At the top of a hill, after pushing hard, let your feet rev up for 30 to 40 revolutions before shifting up. This limbers up the muscles and reduces fatigue. Shift one step at a time. Avoid large instantaneous changes that destroy your rhythm. On very rapid changes of grade, a wider range shift may be in order. Avoid the tendency to shift a 10 to 15-speed bike like a 3-speed, all the way up or all the way down at one time. Don't go into bottom gear on every hill. Use the flexibility that derailleur gearing offers to get the proper gear for each condition.

Increase Your Skill–Ride Smarter!

Research has shown that the "human engine" operates most efficiently in the pedal speed range of 55 to 85 rpm. Gearing should be selected to maintain a pedal speed for normal riding from the middle to the higher side of this range. It is particularly important on hills to keep a good pedal speed, both to reduce fatigue and to permit easier shifting when needed.

Do not try to "speed" or force a very low gear. Use good ankle action, spin the feet nimbly, but at comfortable speed. If you shift down too low, pedal at normal speed a second or two until the bicycle slows to this speed, then continue foot pressure. To effectively get the tremendous advantage of very low gears, proper pedalling cadence is necessary.

A short rise can often be more easily conquered by applying power in advance and building up speed. Your momentum, in a higher gear, can carry you over the top, at which point you can relax.

Avoid the tendency to cycle in the high gears. Keep these in reserve for "easy" conditions or down hills. LEARN TO KEEP YOUR PEDAL SPEED HIGH–you will be less fatigued.

Occasionally, run at higher pedal speeds. It will help to keep your action nimble, the speed and effortless motion will reduce fatigue. Your increased nimbleness will make downhill spurts more fun when the opportunity arises.

If the range of gears with which your bicycle is fitted proves to be insufficient for the terrain in which you intend to ride, it is often possible for your dealer to fit larger rear sprockets or smaller front sprockets. This can make hill climbing easier. Be certain, however, that your shifter mechanisms will accommodate the largest and smallest sprockets to be used. Many gear shift devices on the market have very limited shifting range.

It may be seen that proper shifting of gears is somewhat of an art. It is best learned by intelligent observation and practice, noting the effects of timing, amount of change and other factors, such as gradient and road speed.

When moving the bicycle about, avoid bumping the gear shifters. When laying the cycle down, place it gear side up. Do not shift levers when pedals are not turning, nor permit others to do so.

Rules for Shifting Gears

1. *The pedals must be kept turning while shifting.*

   The only way the chain can be carried from one sprocket to another is for it to be moving in a forward direction, so never stop pedaling when shifting. Never attempt to shift when back pedaling.

2. *It is not necessary to use all gears in sequence.*

   Select the gear that is most comfortable for the road grade.

3. *Gear selection should be made in advance.*

   Since forward speed must be maintained in order to shift, it's a good idea to shift to a lower gear before stopping in order to be in the proper gear again when you start.

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GENERAL DESCRIPTION OF GEAR POSITIONS

Gear 1 – (Low) Slowest, least pedal pressure needed. Best only for steep uphill grades.

Gear 2 – (Hill) Another low gear. Good for longer grades that are not as steep.

Gear 3 – (Cross) Best used as a "parking" gear–equipment is not damaged if levers are moved while standing still.

Gear 4 – (Hill) For short hills and still headwinds. An easy shift from No. 7 when moving slowly.

Gear 5 – (Wind) Best for moderate headwinds and fatigued legs. Good for a change of pace from No. 7.

Gear 6 – (Hill) An easy downshift from No. 9 for the small hills that aren't even noticed from an automobile.

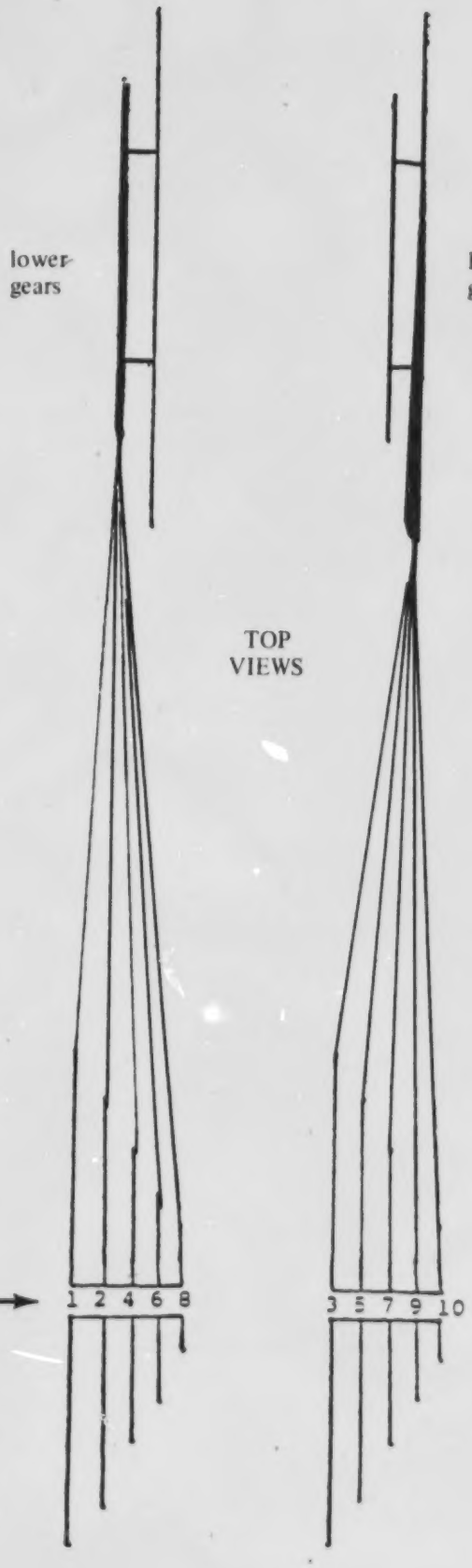
Gear 7 – (Tour) Best for average conditions. With a rapid pedal cadence, fatigue is minimal.

Gear 8 – (Cross) Use only for short periods; hills that suddenly sneak up. Also for storing (no cable strain).

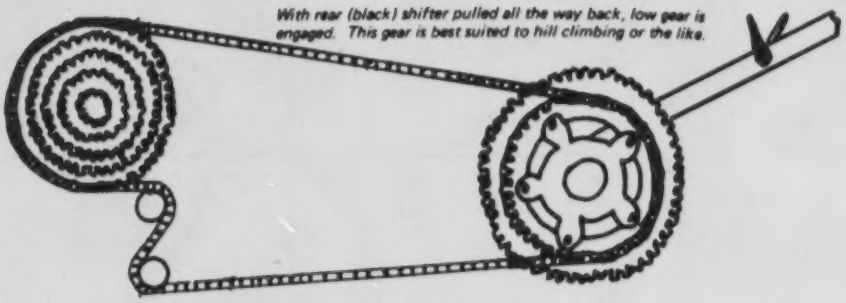
Gear 9 – (Tour) The tailwind gear. Also for high speed trips that don't last all day.

Gear 10 – (High) Very tiring when used on the level for long periods. Be careful not to exceed the speed you can safely handle.

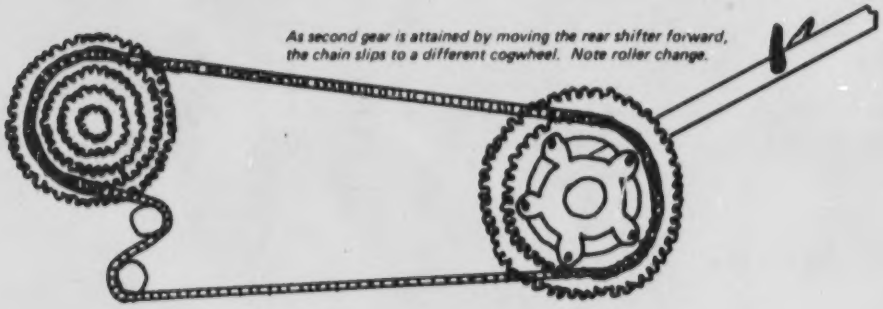
Gears 3 and 8 (cross positions) cause greater chain and sprocket wear and use more energy because of friction losses. These positions are best avoided for long periods of use.



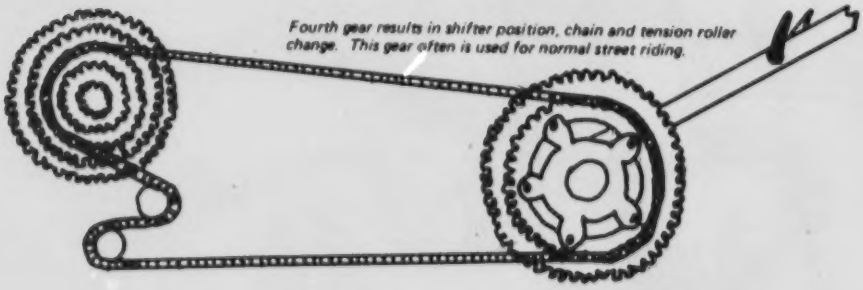
Note: Using the large front sprocket (gears 3, 5, 7, 9, 10) most of the time will allow an easy downshift to lower gears on the small front sprocket (gears 1, 2, 4, 6, 8) for hills. The change should be made before it's needed, with light but steady pedal pressure.



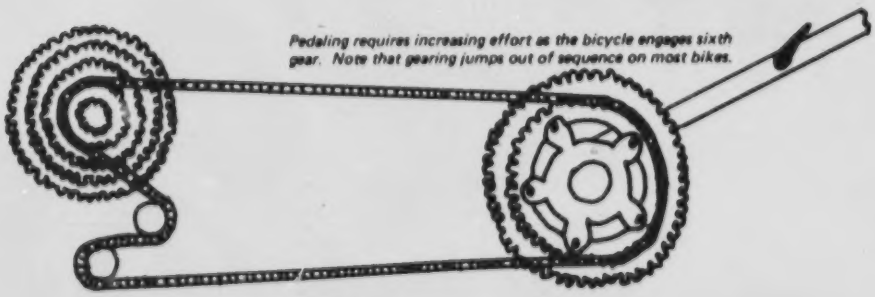
With rear (black) shifter pulled all the way back, low gear is engaged. This gear is best suited to hill climbing or the like.



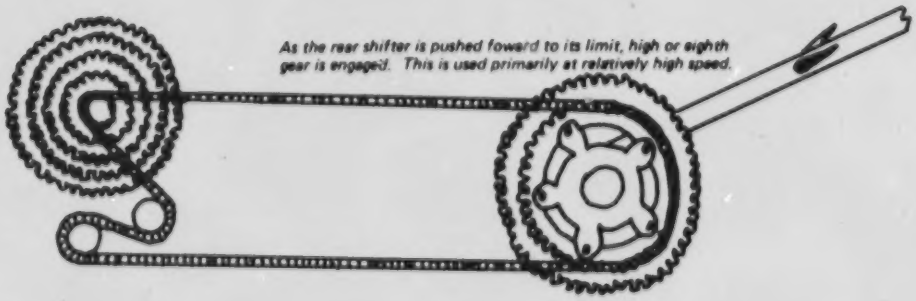
As second gear is attained by moving the rear shifter forward, the chain slips to a different cogwheel. Note roller change.



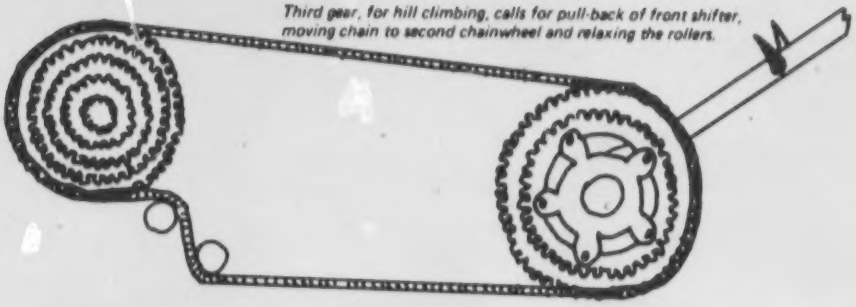
Fourth gear results in shifter position, chain and tension roller change. This gear often is used for normal street riding.



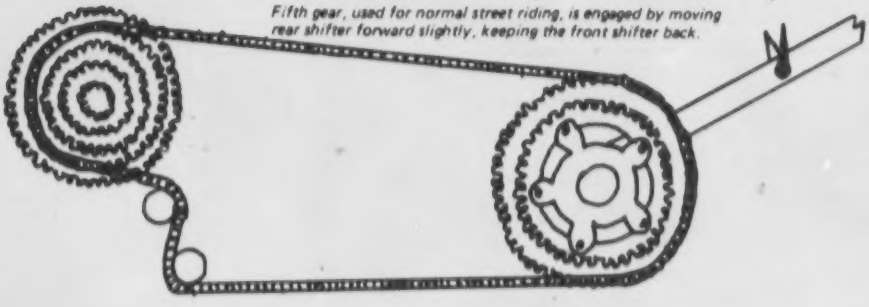
Pedaling requires increasing effort as the bicycle engages sixth gear. Note that gearing jumps out of sequence on most bikes.



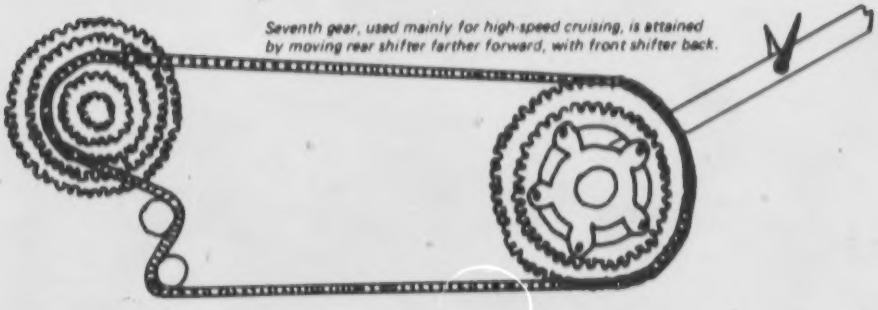
As the rear shifter is pushed foward to its limit, high or eighth gear is engaged. This is used primarily at relatively high speed.



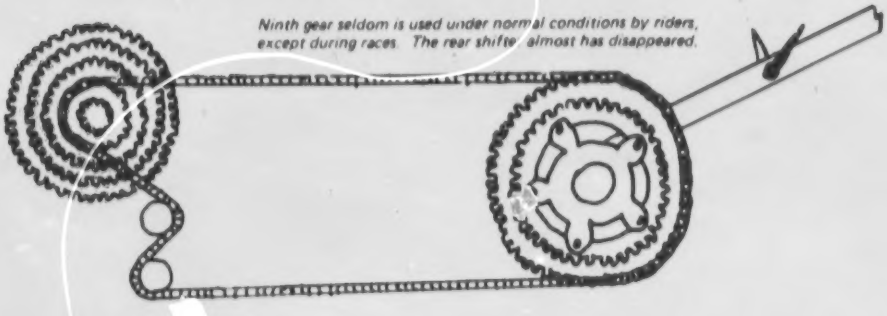
Third gear, for hill climbing, calls for pull-back of front shifter, moving chain to second chainwheel and relaxing the rollers.



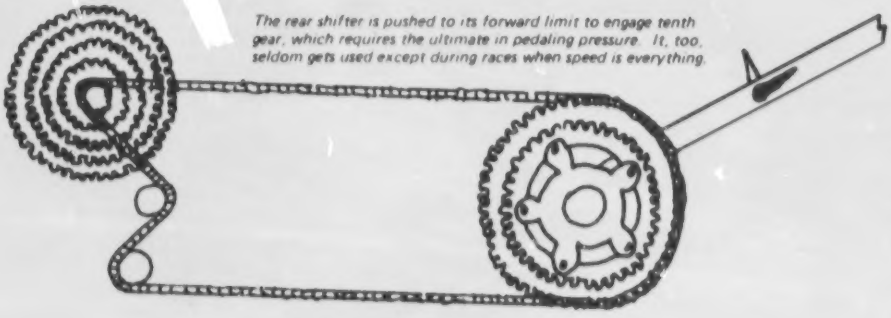
Fifth gear, used for normal street riding, is engaged by moving rear shifter forward slightly, keeping the front shifter back.



Seventh gear, used mainly for high-speed cruising, is attained by moving rear shifter farther forward, with front shifter back.



Ninth gear seldom is used under normal conditions by riders, except during races. The rear shifter almost has disappeared.



The rear shifter is pushed to its forward limit to engage tenth gear, which requires the ultimate in pedaling pressure. It, too, seldom gets used except during races when speed is everything.

Research has shown that the "human engine" operates most efficiently in the pedal speed range of 60-90 revolutions per minute. Gearing should be selected to maintain a pedal speed from the middle to higher side of this range. If you are cycling in a gear that requires a great deal of effort, shift to a lower gear that will allow you to maintain the even, high pedal rate easily. It is particularly important to maintain a rapid pedal rate on a hill, both to reduce fatigue and permit easier shifting when needed. If you are aware that a hill is particularly steep, shift before starting up the hill, so you won't get bogged down in too high a gear, which may cause you to make a slow rough shift.

Hill-climbing: As mentioned previously, keep your pedal rate fairly rapid by using the appropriate low gear. As an alternative position, shift to a slightly higher gear than you would normally use while seated, and stand up to pedal. The main thing to remember in hill-climbing is to conquer the hill gradually. Do not start too fast or you tire very rapidly and the hill gets to you, physically and mentally.

Evasive Action: Rock dodging, instant turns and panic stops are maneuvers every cyclist should be able to do. Like any other drills you have to practice them correctly in order to learn. Practice techniques are explained in the Skill Development Section. © JF

Balance: There is nothing complicated about staying upright and balancing a bike. You stay upright by steering the wheels so they are always exactly under you. A slight swing of the front wheel serves to reinstate the cyclist's balance when he starts to topple. You cannot steer your bike by any great amount of turning of the handlebars or you will steer the wheel out from underneath you, so you will fall. © JF

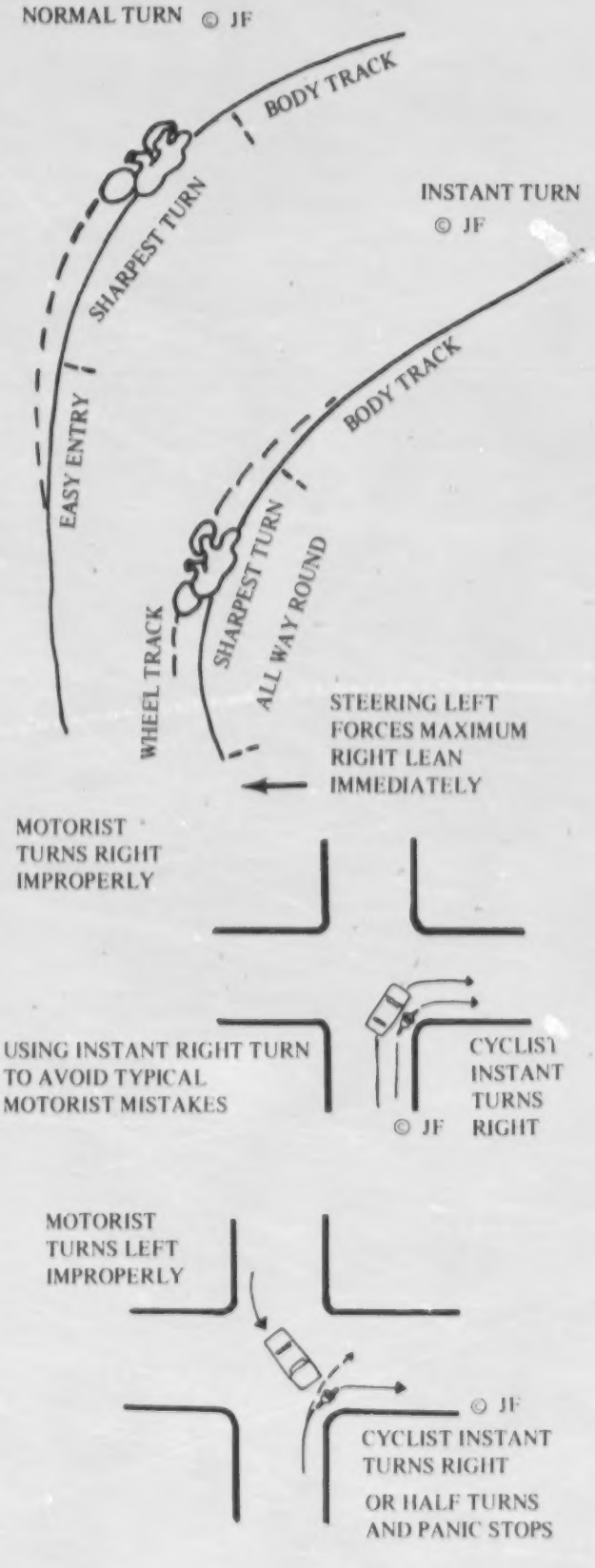
Turns: A maneuver called "out tracking" will enable you to dodge objects and turn more sharply in emergency situations. While staying upright and turning the wheel sharply or suddenly, without leaning over first, you can dodge objects and then, while starting to fall in the opposite direction, you catch yourself by counter steering. Your body and handlebars will have barely moved an inch either way, while missing the object by several inches.

On normal turns you lean slightly in the direction you want to turn and then turn the handlebars. In most cases this action is so close they appear to happen simultaneously.

You let the bike steer itself around the corner, adjusting the position of the handlebars to keep it tracking so it feels as though it were directly under you.

The normal turn takes a gradual and time-consuming approach. When a car jumps out of a side street at you, or overtakes and turns right into you, you want to start that turn immediately and must force the lean quickly into an instant turn.

On an instant turn you "outtrack"—turning the front wheel away from the turn. By doing this you force a lean in the direction you want to go. The moment you have a good lean (a tenth of a second), the wheel should be turned into the turn.



Panic Stops: The third emergency maneuver is the panic stop. Because of the cyclist's momentum and the forward distribution of weight, there is more braking force on the front tire. The front brake therefore is the more powerful of the two. Without using the back brake along with the front you would catapult over the handlebars. Using the back brake only would cause a skid and a loss of steering control.

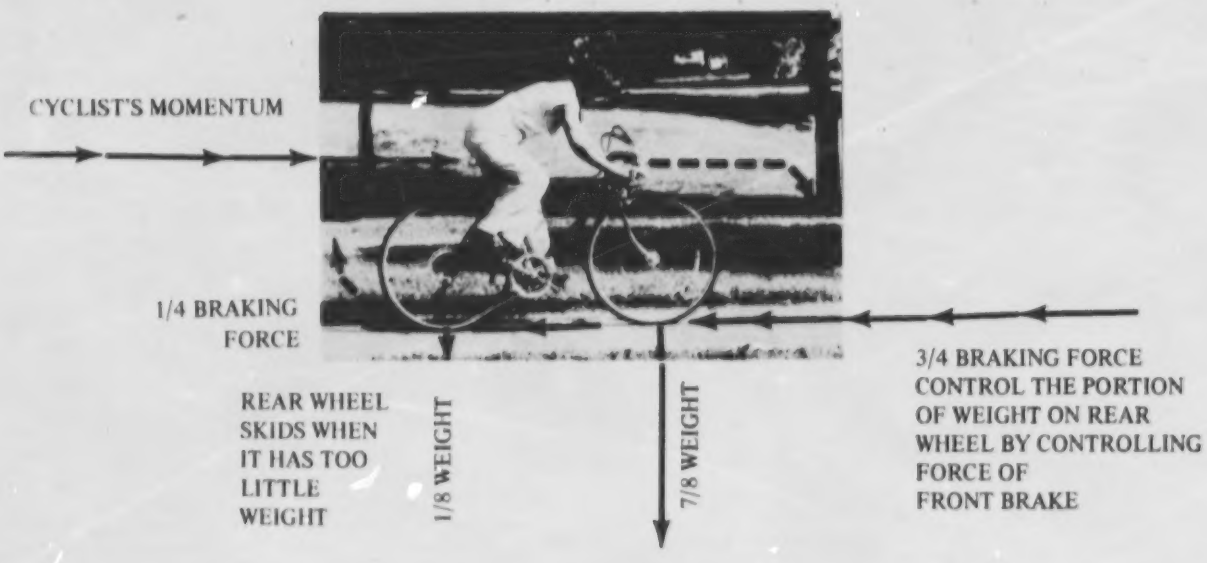
You should apply the front brake harder than the rear brake and push yourself backward and low in the saddle to fight the forward transfer of weight. The farther back you are, the more weight on the back wheel and the more drag you can develop before the rear wheel locks. If the rear wheel skids, ease off just enough to let the rear wheel turn so you will have steering control again. © JF

Braking Caution: The bicycle is a narrow and maneuverable vehicle that can get around many obstacles. It isn't worth the risk of a panic stop if that means you lose your chance to steer around the obstacle. The rule is: panic stop until you are slow enough then ease off the brakes and steer around the obstacle.

In traffic, a panic stop situation is often one in which the car behind might also crash into it, so get slow enough to steer around or even off the road to get out from between the colliding cars.

Loose road surface braking: apply the rear brake gradually while attempting to slow down through gravel, sand, loose dirt, etc. Applying heavy pressure on the front brake may cause the wheel to remain at a bad angle and the bike will slide causing you to fall. © JF

BRAKING FORCES © JF


CYCLIST'S MOMENTUM
1/4 BRAKING FORCE
REAR WHEEL SKIDS WHEN IT HAS TOO LITTLE WEIGHT
1/8 WEIGHT
7/8 WEIGHT
3/4 BRAKING FORCE CONTROL THE PORTION OF WEIGHT ON REAR WHEEL BY CONTROLLING FORCE OF FRONT BRAKE

CHAPTER 8

CYCLING PROCEDURES AND PRACTICES

The safest place to drive a bicycle is where there isn't any heavy traffic. There is no future in trying to ride in areas that have a heavy traffic flow; however, total avoidance is an impossibility in the sharing of the streets and roadways of the transportation system. In most states, the bicycle falls under the same restrictions and regulations which govern the automobile. This includes speed limits, traffic signals, stop signs and direction of travel.

Cycling procedure and practices, then, are dictated to a large extent by the rules of the road. There are some specific regulations that do pertain directly to bicycles that will also influence, along with common sense and servivability, the maneuverability, path selection and course of action the cyclist will follow.

A great majority of accidents are caused by traveling on the wrong side of the road. Bicyclists are required by law to ride as near the right-hand side of the roadway as possible and practicable, exercising due care when passing standing vehicles or those proceeding in the same direction.

A very large conflict exists among active cyclists concerning this requirement of "riding to the right." The conflict is not whether to ride on the right, only how far in determining "as near . . . as possible and practicable" as stated in the law.

The position of where to ride must be determined by recognizing each different condition of the road ahead and preparing to get in the right position on the road well in advance.

Lane Widths – Wide Boulevards © JF

A wide road has its outside lane wide enough for a motorist to overtake a cyclist within the same lane. On wide roads you ride just outside the actual traffic lane not along the curb where gathered debris, cracked pavement and many other hazards are encountered. You should try to maintain about 3 feet from the cars. On standard roads you ride generally just inside the traffic lane, allowing room for a car to pass.

This will put you well away from the parked cars, their doors and cars pulling out as well as away from the many hazards near curb side.

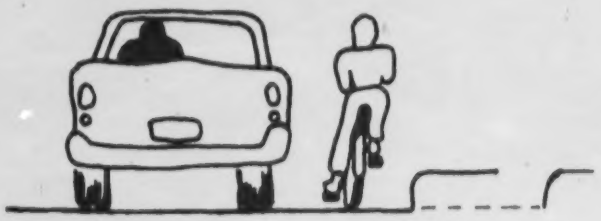
Narrow Lanes © JF

A narrow road no matter how many lanes it has has an outside lane too narrow for a motorist to overtake in the same lane. When the lane is too narrow to permit safe passing inside it, then ride down the center.

Intersections © JF

Often the actually used part of the roadway widens at intersections. Sometimes you should keep going straight regardless; sometimes you should swing over to the right where it widens. What you do depends on why the road gets wider. Sometimes all the traffic lanes move right before an intersection to allow for a left-turn-only lane in the center. At other places the lanes go straight through, but there is a right-turn-only lane on the right. THE LANE STRIPES ARE YOUR BEST GUIDE.

At intersections like these, if the lane stripes swing right, you go right; if they go straight, you go straight. Never, if you want to go straight across an intersection, curve right just because there is more room there. You make the motorist think that you are turning right, and when you are going straight, that can be fatal. When there is a traffic signal at this kind of intersection you may be the first driver stopped in the right-hand lane. The no-parking strip just before the corner is for right turning motorists, who in many states can turn right against the red light after stopping. Never go to the curb to let these right-turning drivers pass you on the left. Move left towards the through lane and let the right turners pass on your right.



WIDE LANE © JF
RIDE JUST TO THE RIGHT OF THE CARS, EVEN WHEN THE CURB IS FARTHER RIGHT

A STANDARD

B WIDE

NARROW LANE © JF
RIDE IN CENTER

If there is only a narrow one lane, then stay in the center of the lane. If you aren't first in line wait your turn in line. If you were cycling on a wider road to the right side and the lane narrows at the controlled intersection, stop way behind so conflicts with the turning vehicles aren't contested.

At intersections with a combined right and through lane, pick the side of the lane depending on what the drivers ahead show they are going to do or cycle on the side appropriate for your destination. If the car driver is flashing right turn signals, or has moved over to the curb, you go left. If you are first at the signal, look back at the flasher of the car behind, and move sideways left if he wants to go right.

If you follow these rules you won't get run down as you start out when the light turns green.

Right Turn Lanes Only © JF

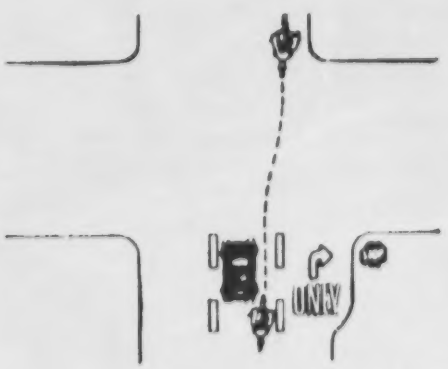
If you want to go straight NEVER enter a right-turn-only lane. The law is explicit everywhere; any vehicle which enters such a lane must make the turn.

Forward Movement at Intersections

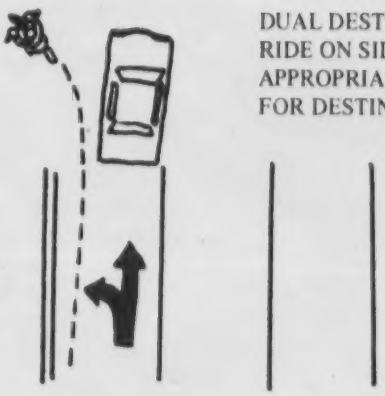
Intersections are very different and you must know what to do in each type of intersection. But the same general rules apply in all intersections whether you are turning left, turning right, or going straight ahead. You must:

- Obey the traffic signals and pavement markings.
- Signal to indicate any change in direction.
- Move with the traffic.

If you approach a lane that is marked RIGHT TURN LANE and you wish to go straight ahead, it is best to move to the left, traveling next to the lane of traffic which continues straight.



WITH SIGNIFICANT
RIGHT TURN TRAFFIC
THIS IS A
DUAL DESTINATION LANE
© JF

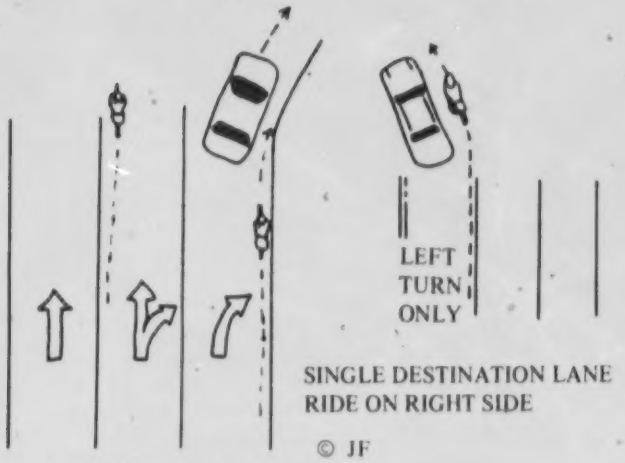


DUAL DESTINATION LANE
RIDE ON SIDE
APPROPRIATE
FOR DESTINATION
© JF

One reason this is so important is that many accidents happen when motorists, who are turning right, fail to see a bicycle to the right of them. They start their turn and move into the bicyclist, as you can see in the drawing.

Cyclist Lane Rules © JF

- Normally drive at the right side of the outside through lane.
- When you enter a turn lane, if it goes to only one destination, drive on its right side.
- If a lane serves two destinations, like straight or left, move to the appropriate side for your destination.



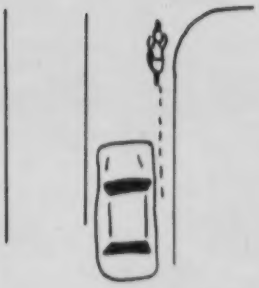
SINGLE DESTINATION LANE
RIDE ON RIGHT SIDE

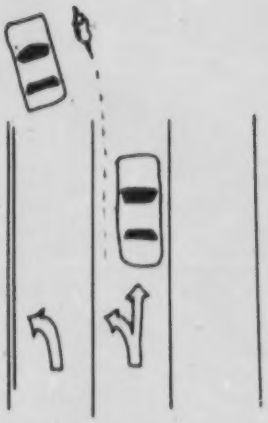
© JF

CYCLIST RIDES SO HE
DOES NOT CROSS TRAFFIC
INSIDE INTERSECTION

WITH RARE RIGHT TURN
TRAFFIC THIS IS A
SINGLE DESTINATION LANE

© JF

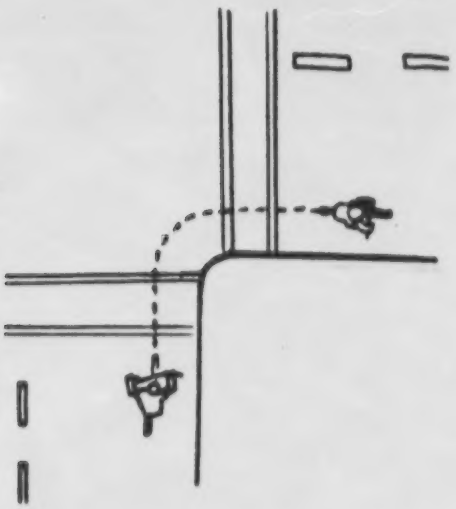




CYCLIST RIDES SO HE
DOES NOT CROSS TRAFFIC
INSIDE THE INTERSECTION © JF

Right Turns

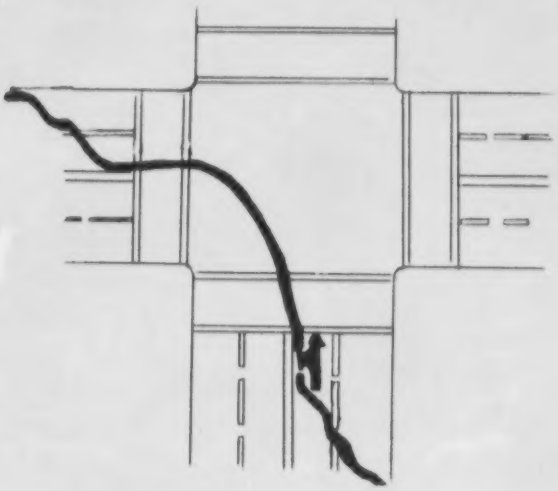
Right turns must be made from the right-hand lane of the street. Always signal before turning. Stay close to the curb and always turn into the right-hand lane of the street which you enter.

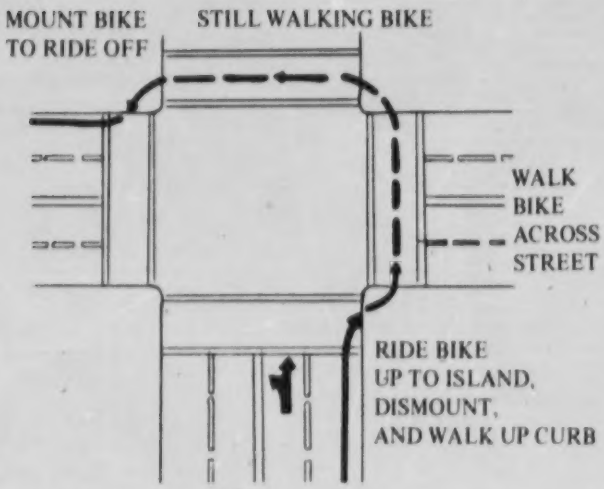


Left Turns

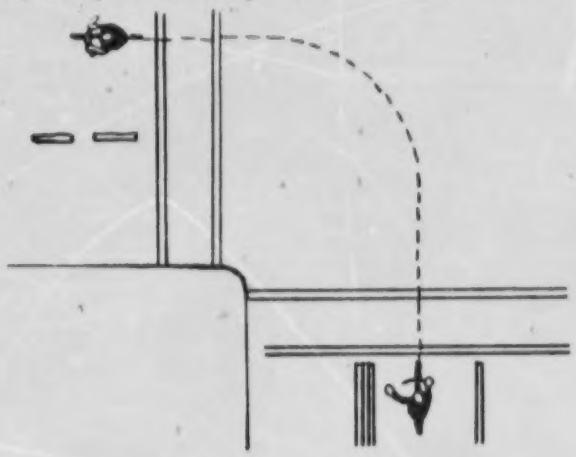
If you are in a left and through lane, straight-through drivers will overtake you on your right – that is why you get as close as practicable to the center line. © JF

Wait until on-coming straight-through traffic, on-coming cars turning right, and from-the-right clears, before making the turn. You should turn into the first lane and change lanes to the right as soon as possible, checking over your shoulder. If you are not confident of your ability to lane change to the right and traffic is extremely heavy, dismount and walk as a pedestrian.

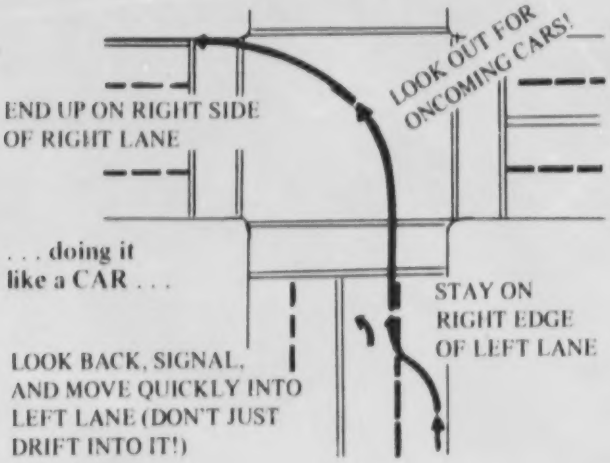




If it isn't a multiple lane that you are turning into then try to stay close to the right curb.

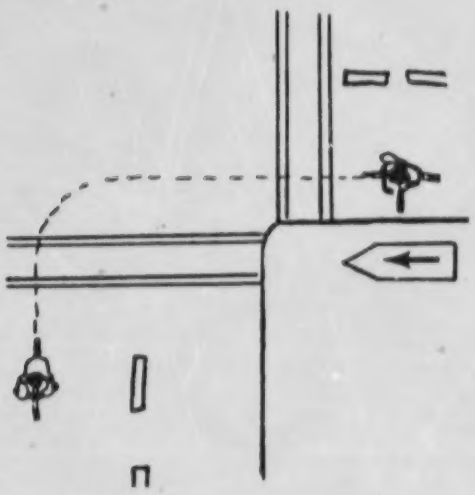


In a left-turn-only lane stay on the right edge of the left lane. In all cases you are the turning driver who must yield to all other traffic. You must wait just like you would for a stop sign, before entering the intersection. © JF


LOOK OUT FOR ONCOMING CARS!
END UP ON RIGHT SIDE OF RIGHT LANE
. . . doing it like a CAR . . .
STAY ON RIGHT EDGE OF LEFT LANE
LOOK BACK, SIGNAL, AND MOVE QUICKLY INTO LEFT LANE (DON'T JUST DRIFT INTO IT!)

Left Turns From One-Way Streets Onto One-Way Streets

If you are making a left turn from a one-way street, make your turn from the left side of the street, close to the curb. Again, always signal and always obey the traffic signals.

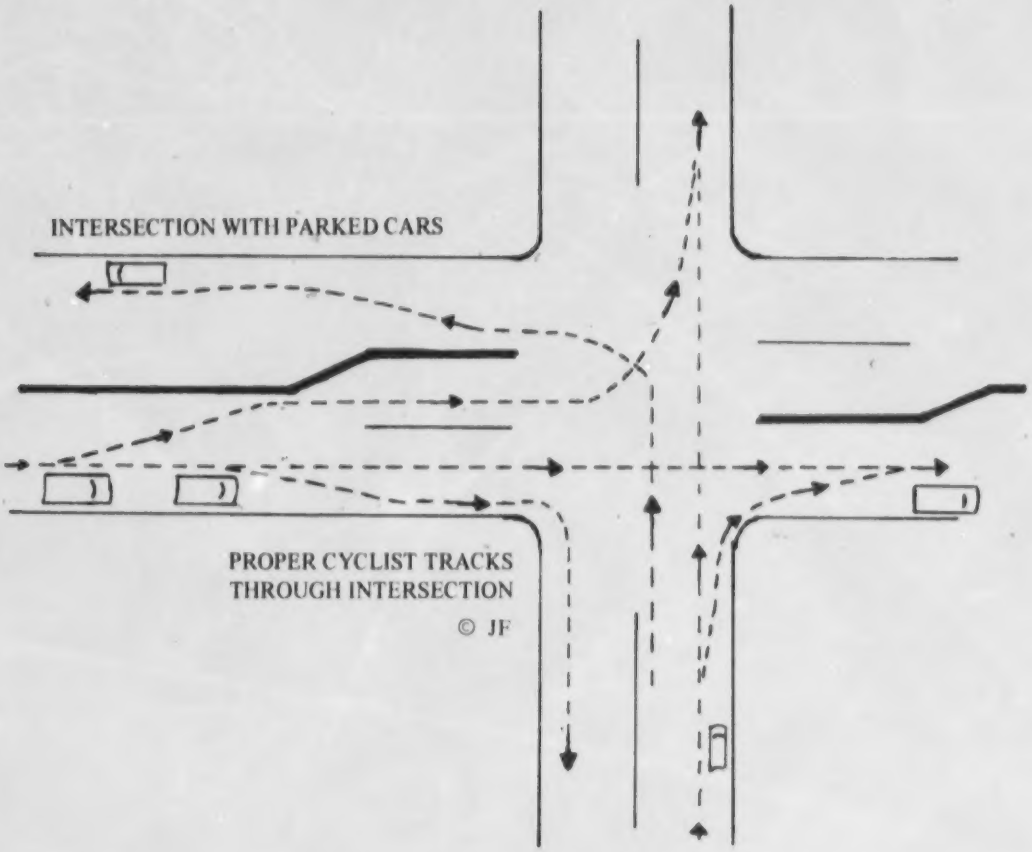


Left Turns From One-Way Onto Two-Way Streets

If you are making a left turn from a one-way street onto a two-way street, stay in the left lane until you ride across the intersection. When you reach the correct traffic lane, turn into it staying close to the right curb.

Major Points on Turns © JF

1. Get prepared for an intersection by getting in the proper lane well in advance.
2. Know what you are planning to do, and carry it out smoothly and completely.
3. Notify those drivers who will be affected by first giving the appropriate signal–left arm.
4. When traffic is so fast and heavy that you cannot merge over into the left lane in time, keep riding straight to the next intersection.
5. NEVER TURN LEFT FROM THE RIGHT-HAND LANE.



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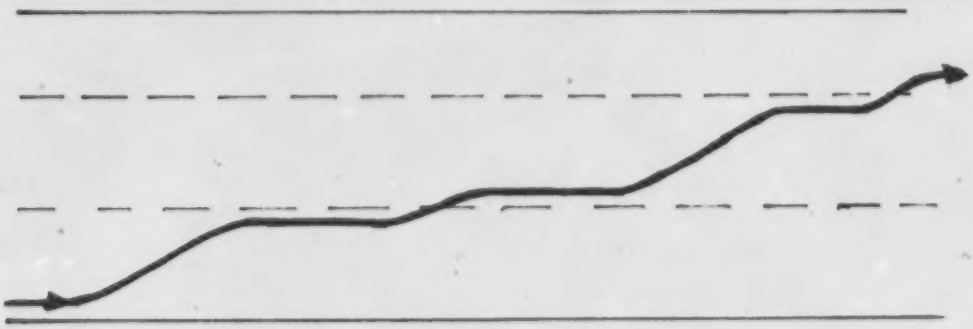
Changing Lanes in Traffic © JF

1. If you are going to change lanes, it is your "own lookout" to do it safely.
2. Negotiate with the driver behind you in the new lane. Make sure of eye contact. Make sure he agrees to let you in by giving you room, slowing down, or other positive action.
3. Always make two moves per lane; one just into the lane, the second across the lane to its other side. This avoids an accident if there is a mistake in negotiations.
4. Always start early—allow yourself plenty of time and distance.



Cyclist's track when changing lanes on a multi-lane street. Each sideways move is a separate lane change, and for each the cyclist must verify that traffic permits the move. © JF

Riding at Night © JF

In darkness we must identify vehicles by their lights or by reflectors illuminated by the bicycle headlamp beams. Since you can see unlighted objects only when they are in the headlamp beams, and unreflectorized objects only at shorter distances than in daylight, in general a slower speed is more advisable in darkness than in daylight.

Cycling at night with proper headlamps and rear reflectors is not much different from riding in the daylight. It is more important to travel where you will be seen, so avoid sidewalks and driving close to bushes and parked cars and pay attention to driving in a straight line close to the moving cars.

At night, never enter an intersection unless you can get directly across it to a place of safety.

Riding in the Rain © JF

This presents several safety problems: visibility is less, brakes don't work as well, and the road is slippery.

Wearing proper rain clothing and using mudgards will help keep the cyclist comfortable, dry and clean. Raincoats and complete rain suits are unsatisfactory for the cyclist. The proper wet weather clothing is a cyclist cape, hat and spats.

The additional collisions caused by cycling in the rain seem to be mainly caused by poor visibility.

Take special care to drive where you will be seen, avoid sidewalks, bushes or parked cars and drive straight close to the moving cars. Take particular care to observe the movement of cars from side streets to determine whether the driver has seen you or not.

The rim brakes work less well when wet. The brakeblocks will slip until the water is off the rims. When cycling in traffic in the rain allow an extra car length or two to give your brakes distance in which to catch.

Road surfaces get slipperier in some places than in others, you should allow an extra safety distance ahead and go easy on turns. You must keep especially alert for areas that have grease from cars, bus stops, drain grates, manhole covers, tracks and painted lines and try to avoid them by turning long before you get to them. Try to avoid any sudden or sharp movements.

CHAPTER 9

ADJUSTMENT, REPAIR AND MAINTENANCE

Tools Required to Adjust Bicycles

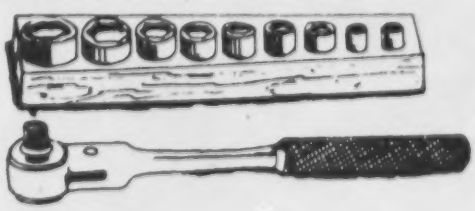
To adjust your bicycle you will need tools. You will have many of the necessary tools in your home tool kit, but with the many makes of bicycles (including foreign makes) on the market today, there are some adjustments that require special tools. The dealer who sells your make of bicycle should have these tools to help you make adjustments when needed. If your bicycle requires special toosls, you should take it to a dealer or repairman if at all possible.

Some of the common tools that you may need are:

Open end or box end wrenches ranging in sizes from 3/8 in. to 13/16 in. or metric wrenches ranging from 8 mm through 15 mm.

Adjustable (crescent) wrenches (8 in. and 12 in.) for odd size nuts or bolts.

Socket wrench set with rachet handle to speed work. Same sizes as open end or box end wrenches.

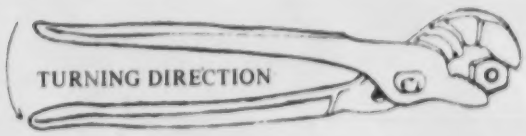


Screwdrivers

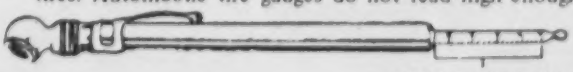
Phillips

Straight blade

Slip-joint plier for large nuts that a wrench may not fit. Protect the nut by placing a cloth between the nut and the plier.



Bicycle tire pressure gauge that reads at least 60 psi. (A good bicycle tire pressure gauge is a must for checking tires. Automobile tire gauges do not read high enough.)



Bicycle tire pump. (A long bore, high volume pump will save a lot of time and pumping.)

Spoke wrench. This is the only tool that should be used to adjust the spokes in the bicycle wheel.

When using hand tools, make sure they fit snugly. The tip of the screwdriver should completely fill the slot of the screw or it may slip and damage the screw.

Wrenches should also fit tightly on a nut or they will slip and grind off the shoulders of the nut. NEVER use a pliers where a wrench will fit.

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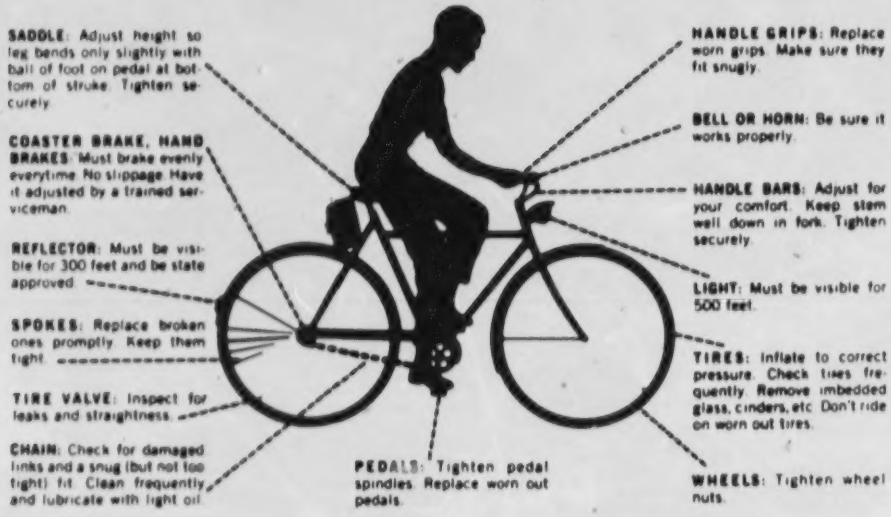
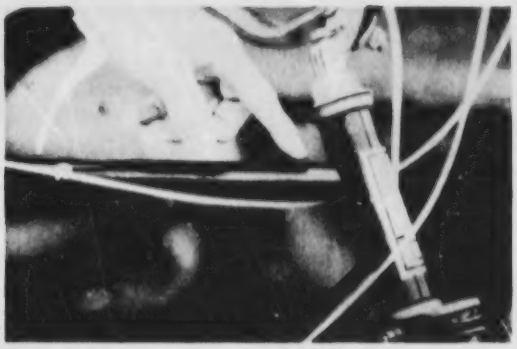
HAVE YOUR BICYCLE CHECKED TWICE A YEAR BY A RELIABLE SERVICEMAN


SADDLE: Adjust height so leg bends only slightly with ball of foot on pedal at bottom of stroke. Tighten securely.
COASTER BRAKE, HAND BRAKES: Must brake evenly everytime. No slippage. Have it adjusted by a trained serviceman.
REFLECTOR: Must be visible for 300 feet and be state approved.
SPOKES: Replace broken ones promptly. Keep them tight.
TIRE VALVE: Inspect for leaks and straightness.
CHAIN: Check for damaged links and a snug (but not too tight) fit. Clean frequently and lubricate with light oil.
PEDALS: Tighten pedal spindles. Replace worn out pedals.
HANDLE GRIPS: Replace worn grips. Make sure they fit snugly.
BELL OR HORN: Be sure it works properly.
HANDLE BARS: Adjust for your comfort. Keep stem well down in fork. Tighten securely.
LIGHT: Must be visible for 500 feet.
TIRES: Inflate to correct pressure. Check tires frequently. Remove imbedded glass, cinders, etc. Don't ride on worn out tires.
WHEELS: Tighten wheel nuts.

ALWAYS RIDE WITH CAUTION • TAKE GOOD CARE OF YOUR BICYCLE

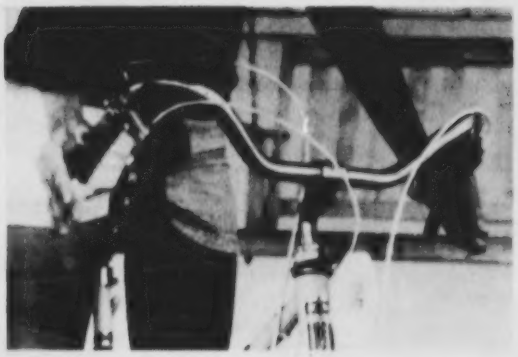
When checking the wheels, give the spokes a twang, to check for loose ones. They can be tightened easily.



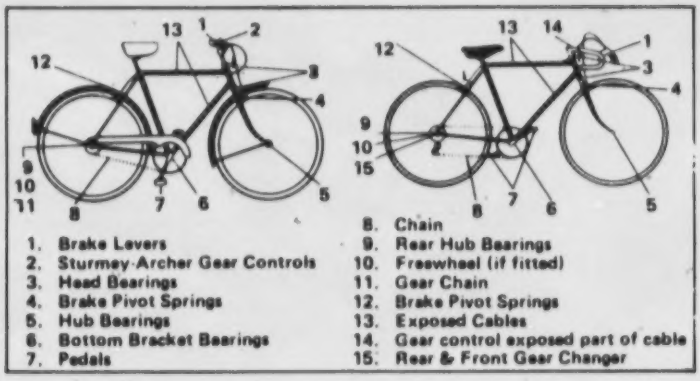
While frame cracks are unlikely on a one-speed bicycle, periodic checks should be held to assure this fact.

To promote both sprocket and chain life, a light coat of oil should be applied to the chain often. Besides preventing rust, which weakens the chain, it cuts noise.

Make sure the fenders on your bike are tight, or the jangling noise will detract from enjoyment of your ride. Tighten all bolts periodically.



Pushing downwards on the handlebars is the best way to check for a loose tube, which could be unsafe (left)



1. Brake Levers
2. Sturmey-Archer Gear Controls
3. Head Bearings
4. Brake Pivot Springs
5. Hub Bearings
6. Bottom Bracket Bearings
7. Pedals
8. Chain
9. Rear Hub Bearings
10. Freewheel (if fitted)
11. Gear Chain
12. Brake Pivot Springs
13. Exposed Cables
14. Gear control exposed part of cable
15. Rear & Front Gear Changer

Lubrication

Lubricate the parts shown except the bearings (items 3 and 6) with a drop of oil when new and every four weeks when in use, or after any lengthy storage. DO NOT ALLOW SURPLUS OIL TO DRIP ON THE TIRE OR RUN DOWN THE SPOKES AND CAUSE DAMAGE TO THE TIRES. Every six months ask your dealer to check the bearings (items 3 and 6) and if necessary clean and repack them, using a good quality Ball Race grease.

Very Important Points

DO NOT OVER OIL–as too much oil with attract dirt and road grit. CLEAN OFF ANY OIL, GREASE, OR POLISH, FROM THE BRAKE TRACK ON WHEEL RIMS, and BRAKE BLOCKS TO ENSURE SAFE, EFFICIENT BRAKING. Regularly check for wear and tear of your bicycle and replace parts when necessary.

Cleaning

Clean your machine (except the chain) with warm soapy water. Rinse with clean water and dry with a soft clean cloth. Do not use metal polish on chromium plated or alloy parts.

Every six months disengage the chain from the sprockets and clean thoroughly with paraffin (kerosene) making sure all grit is removed. Dry with clean cloth. In sandy and dusty environments more frequent cleaning may be required. Afterwards lubricate the bicycle.

When storing your bicycle for an extended period, oil your machine and smear the chromium plated parts with a light grease. Your bicycle should be hung up to protect the tires.

Many types of lubricants (below) are marketed and work well. A bike needs lubrication for smoothness of operation.

Shift Levers

Lever should be tight enough to hold gear, otherwise tighten the tension lever wing-type screws on the side of each lever. DO NOT LUBRICATE! The levers work on friction which keeps lever from shifting by itself.

LUBRICATION LIST © JF

BEARING	LUBRICANT	HOW TO LUBE	FREQUENCY
Chain	Thin oil	Brush	weekly/rain
Derailleur wheels	Thin oil	Brush	weekly/rain
3-speed hub	Oil	Oil can one squirt	weekly/monthly
Hubs	Oil	Oil can one half squirt	weekly/rain
	Grease	Disassemble	6 months
Bottom bracket	Oil	Oil can one squirt	weekly/rain
	Grease	Disassemble	6 months
Pedals	Oil	Oil can one half squirt	weekly/rain
	Grease	Disassemble	6 months
Derailleurs	Thin oil	Brush	weekly/rain
	Oil	Oil can	weekly/rain
Brake cable ends	Oil	Oil can one drop	monthly
Brake calipers	Oil	Oil can four drops	monthly
Headset	Grease	Disassemble	yearly
Shift levers	Grease	Disassemble	cable change
Brake cables	Grease	Disassemble	6 months
Derailleur cables	Thin oil	Brush	monthly
	Grease	Disassemble	6 months
Brake levers	Oil	Oil can two drops	6 months
Freewheel	Oil	Wash in solvent	noisy/removed/
		dunk in oil	6 months/sticky

Pedal Checks

The pedals should be firmly secured in the crank arms and the pedals should turn freely. In addition, the pedals should be complete and intact, that is the rubber treads may have broken off and only the pedal shaft remains.

Pedal Adjustments

If the pedals are not properly secured in the crank arm, tighten the pedals until they are firmly seated against the crank arms. NOTE: The right hand pedal has a right hand thread and the left hand pedal has a left hand thread.

If the pedals are damaged or have missing parts, the bicycle should be returned to a dealer for service.

NOTE: The terms left and right are determined from the riding position.

Pedal with 'L' on axle end fits in the left crank.

FROM THE LEFT SIDE OF THE BICYCLE: Turn axle in counter-clockwise direction with wrench and FULLY tighten.

Pedal with 'R' on axle end fits in chainwheel crank.

FROM THE RIGHT SIDE OF THE BICYCLE: Turn axle in clockwise direction with wrench and FULLY tighten.

Pedal Bearing Adjustment

Correctly adjusted, the pedal should revolve freely without excessive play at the end of the pedal.

To adjust pedal bearings:

Unscrew and remove the end cap.

Loosen the cone locknut 'B' with suitable wrench.

Ease the tongued lockwasher 'C' away from the cone 'D'. The outer face of the cone has a slot to accept a screwdriver for adjustment purposes.

To tighten the cone, turn the cone clockwise.

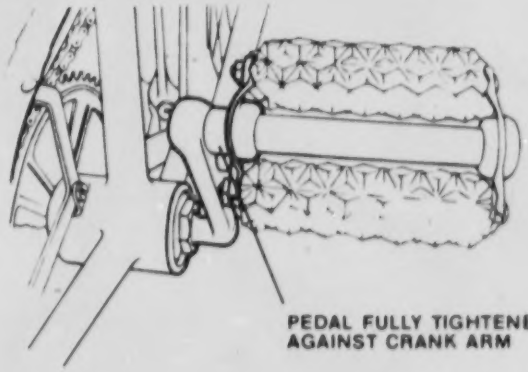
After adjusting pedal bearing, push lockwasher 'C' up to cone 'D' and tighten locknut 'B' firmly.

Replace pedal end cap 'A' securely.

NOTE: If pedal cap 'A' is not removable the pedal is not user serviceable.

The best type of crank—the part to which the pedals are attached—is cotterless, made of aluminum and generally not found on a bicycle of medium price range. However, if you do get lucky and buy a bicycle with the cotterless cranks, assure that you purchase the crank tool before leaving the shop. As the miles fly past, the cranks get loose and the steel axle will gouge the soft aluminum, rendering them useless.

Tighten them whenever you think about it and certainly not less than every twenty miles until a few hundred miles have been logged.



PEDAL FULLY TIGHTENED AGAINST CRANK ARM

WARNING
ALWAYS KEEP PEDAL AXLES TIGHT IN CRANK ARM

CAMPAGNOLO PEDALS
D = RIGHT

CAMPAGNOLO PEDALS
S = LEFT

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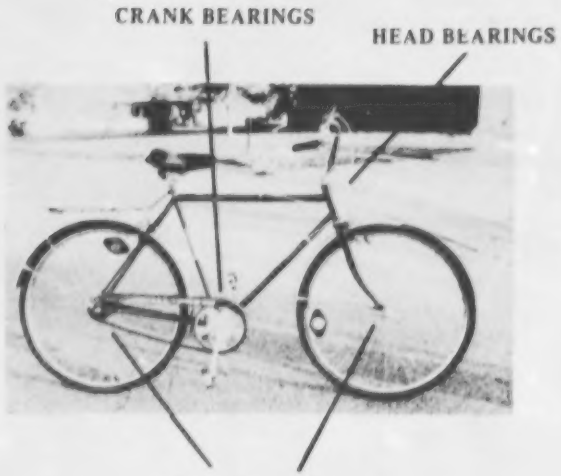
Bearing Cone Adjustments

An important part of bicycle ownership is keeping the bearing cones of your bike in good adjustment. You should know how to inspect for "drag" and "play." Drag is unnecessary rubbing or binding that keeps a part from moving smoothly or easily. Play is too much looseness which will often cause wobbling. Both "drag" and "play" are undesirable.

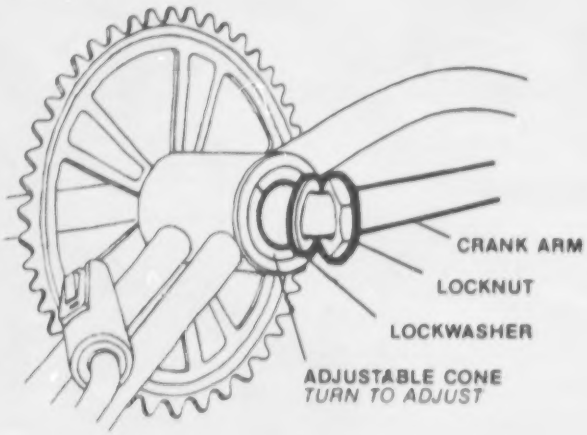
The bearings are located in the crank, wheel, and head as indicated in the figure in the upper right.



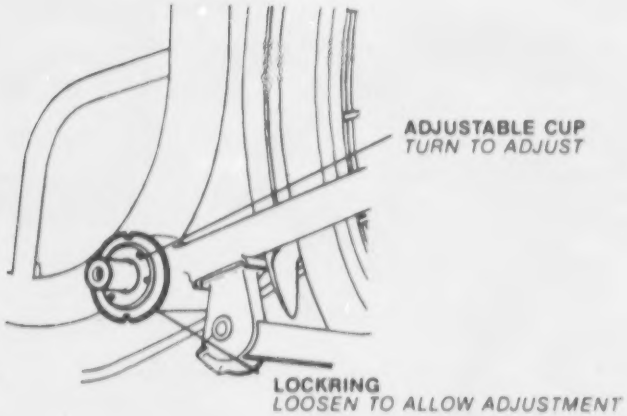
Pedal Crank Bearing Checks

To test for proper adjustment of the pedal crank bearings, the crank should turn freely with no binding and with no unusual noises. Test for excessive side play in the crank by attempting to move the crank from side to side. There should be no more than a trace of side play at the end of the cranks.

Check pedal crank "play."



TYPICAL ONE PIECE CRANK ASSEMBLY



TYPICAL THREE PIECE CRANK
CRANK ARMS AND PEDALS NOT SHOWN

Pedal Crank Bearing Adjustments

Although bicycles are equipped with a variety of cranks, most bicycles have some sort of an adjusting cone on the crank opposite from the sprocket. The general procedure is usually as follows: loosen the locknut or retaining nut and then adjust the adjustable cone bearing until the crank has the proper amount of side play. Make sure there is a keyed lockwasher between the locknut and the adjustable bearing and then fully tighten the locknut.

How to Adjust Pedal-Crank Bearing Cones

1. With a large adjustable wrench, loosen the lock nut (Figure 1). Be careful to turn it the correct direction to get it off because it may be threaded left or right.

2. Tighten or loosen the adjusting cone located under the lock nut so that the crank spins without drag or play (Figure 2). To do this, place a screwdriver in the notch on the cone and turn the cone the desired direction.

3. Replace and tighten the lock nut, making sure the washer is placed correctly under the lock nut.

4. Spin the crank to check the adjustment.

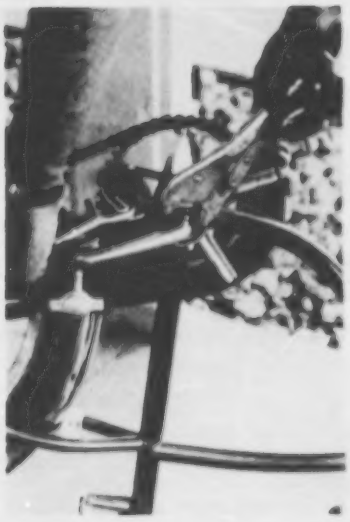


Figure 1. Loosen lock nut.

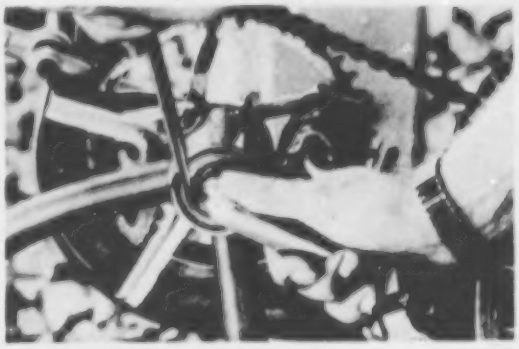


Figure 2. Adjust cone.

Wheel Bearing Checks

To check the bearing adjustments on the front and rear wheels, hold the edges of the wheel and try to twist the wheel. There should be no more than a trace of side play in the wheel. Figure 3.

Next, spin the wheel and see if the wheel turns easily. There should be no grinding noises and the wheel should come to a slow stop, usually with the valve stem ending up at the bottom of the wheel revolution.

Wheel Bearing Adjustments

Wheel bearing adjustments are not especially difficult, but the proper size cone wrenches are absolutely essential. Cone wrenches should be available in both American and metric sizes.

To adjust the wheel bearings locate the adjusting nut on the hub and loosen the axle nut on that side. Turn the adjusting nut until the wheel runs freely and has only a trace of side play. Retighten the axle nut.

Figure 3.
Check front
wheel for play.

How to Adjust Front Wheel Bearing Cones

1. Loosen the axle nut on one end of the axle (Figure 4).

Figure 4.
Loosen axle nut.

2. With one or two (Figure 5) thin, open-end wrenches, adjust the cone (the inner-most nut) so the wheel will spin without "drag" and without "play." NOTE: If there is a very thin lock nut just outside the cone, two wrenches will be needed to adjust the cone. Loosen the lock nut before adjusting the cone; tighten it after adjusting. If there is no lock nut, only one wrench will be needed.

3. Tighten the axle nut making sure the wheel is centered in the fork.

4. Be sure the axle nut on the other side is tight.

5. Spin the wheel to check adjustment. Be sure the bearings did not get too tight when the axle nut was tightened.

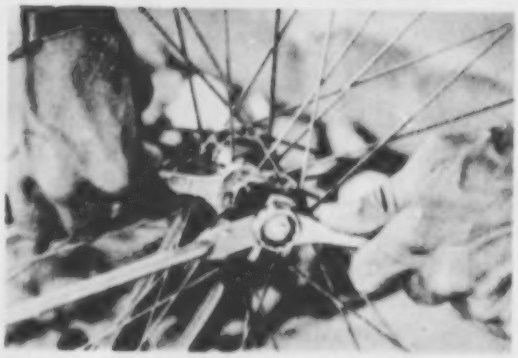


Figure 5.
Use open-end wrenches.

Rear Wheel Bearing Cones

Is there "play" sideways in the rear wheel of your bicycle (Figure 6)?

Figure 6.
Check "play"
in rear wheel.

How to Adjust Rear Wheel Bearing Cones

1. The rear axle nut must be kept tight on one side. If you have a coaster brake bicycle, the axle nut on the brake arm side should be kept tight. If your bicycle does not have a coaster brake, keep the axle nut on the sprocket side tight.

2. After checking for one tight axle nut, loosen the axle nut opposite the one just checked (Figure 7).

3. With one or two open end wrenches adjust the cone so the wheel spins freely without "drag" and without "play" (Figure 8). NOTE: If there is a very thin lock nut on the outside of the cone, it will have to be loosened (using two wrenches) before the cone can be adjusted. Be sure to tighten the lock nut again.

4. Tighten the axle nut making sure any lock washers are in the proper place and that the wheel is centered in the rear fork.

5. Spin the wheel to check the bearing equipment.

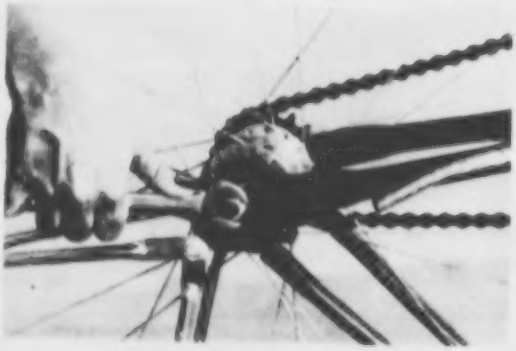


Figure 7.
Loosen axle nut.

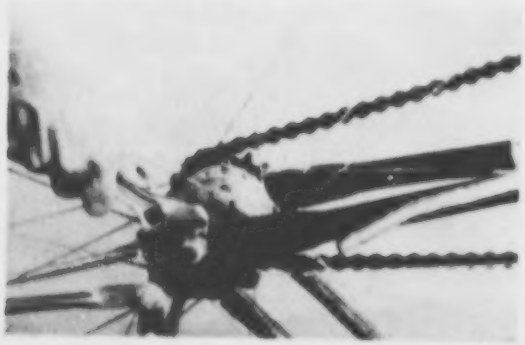


Figure 8.
Adjust cone.

7 j

Head Bearing Checks

Lift the bicycle up and turn the handlebars. The handlebars should turn freely and there should be no more than a trace of side play at the edges of the handlebars.

Head Bearing Adjustments

Again, head bearing adjustments are not difficult but the proper tool–in this case a 1-3/16 in. open end wrench–is essential. Loosen the head lock nut and turn the adjustable bearing cone which is usually just below the lock nut until the fork turns freely with no more than a trace of side play. Retighten the head lock nut. NOTE: An adjustable pipe wrench should not be used on the head and cranks hanger lock nut as the jaws will probably damage the finish and perhaps round off the flats.

Front Fork Assembly Adjustment

Does your bicycle front fork turn freely from side to side? Does your bicycle fork have "play" in it (Figure 9)?

Figure 9.
Check for "play."

How to Adjust Front Fork Cones

1. With a large adjustable wrench, loosen the large lock nut at the top where the fork goes through the head (Figure 10).
2. Tighten or loosen the adjusting cone so that the fork swings without "drag" and without "play" (Figure 11). The adjusting cone usually looks like a washer except that the edge has small ridges on it, or there are small notches into which a screwdriver blade can be inserted. This adjusting cone can be turned by the fingers or by using a screwdriver to turn it around. (If the adjusting cone is rusted tight, a large pliers may be needed to free it.)
3. Tighten the lock nut after adjusting the cone.
4. Swing the fork to check the adjustment.

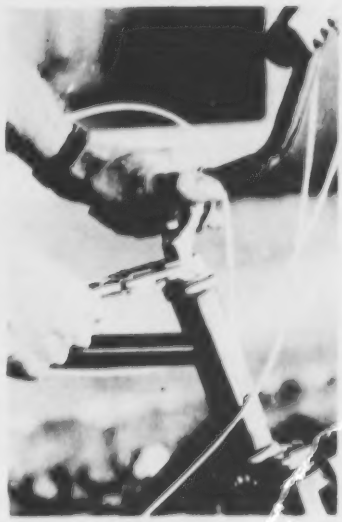


Figure 10.
Loosen the lock nut.

Figure 11. Check the adjusting cone.

Bicycle Wheel Checks

To test bicycle wheels for trueness, lift the bicycle up and spin the wheel. The spinning bicycle wheel should not rub against any part of the frame or the brakes (Figure 12). There will, however, be some variation of the bicycle wheel to either side and perhaps up and down. As long as this is within reason (no more than 1/16 in.) the bicycle should be checked o.k. in this category.

Figure 12. Spin front wheel.

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Adjustments

Although trueing a bicycle wheel is not a very complex procedure, it does require the services of a person who is reasonably familiar with this procedure. Basically, trueing a bicycle wheel is performed as follows: if the bicycle wheel, for example, is out of true towards the left, loosen the spokes in the suspected area which come from the left side of the hub and tighten the spokes in the suspected area that come from the right side of the hub. Do this gradually, a little bit at a time, checking as you proceed until the wheel runs reasonably true.

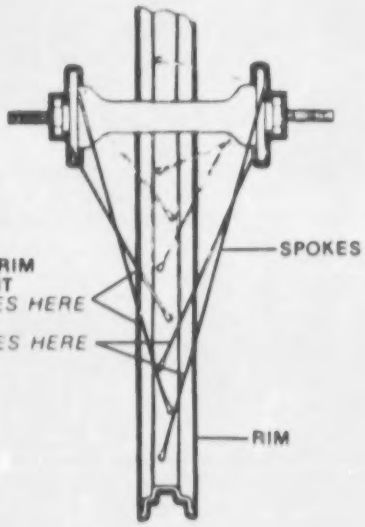
Bicycle Spoke Checks

The bicycle wheel should not be missing any spokes and all of the spokes should have approximately the same degree of tightness. The spokes can be checked by simply feeling to see if they are tight or by snapping them with a finger. A properly tightened spoke should have a relatively high-pitched "ping" sound.

Adjustments

To replace any missing spokes the wheel would have to be removed from the bicycle and the tire and tube also removed from the rim. Additionally, the correct size spoke and nipple will have to be obtained. Because of the variables involved in such a procedure, the bicycle should be returned to a dealer for replacement of any missing spokes.

Tightening the spokes is a much simpler operation and can be performed in the field providing that a good spoke wrench is used. Again, the spokes should be tightened enough to be taut but not enough to upset the wheel trueness.



TYPICAL WHEEL CROSS SECTION

Keep Wheels and Spokes Aligned

For safe riding, the wheels on your bike must be in correct alignment. All spokes must be in place and tight. Although you can replace broken spokes yourself, it's a good idea to let your bicycle serviceman check your wheel alignment and make any necessary adjustments whenever a spoke is replaced. Improperly tightened spokes can cause humps and wiggles in the wheel.

Rough riding, particularly over gravel roads or bumpy streets, is likely to cause your bike wheels to get out of alignment. Even normal riding under the best conditions can eventually result in wobbly wheels or faulty wheel alignment.

Spoke Tightening

Loose spokes–or those that are overly tight–can cause complications for a bike rider, not the least of which is ruination of the rim. They can cause uneven travel between the forks, which makes braking a problem.

To determine the uniformity of spoke tightness, turn the bicycle upside-down, resting on the seat and handlebars. Spin the wheels one at a time and angle a light sliver of wood in the path of the spokes as they revolve. Striking the small wooden stick results in a pinging noise, which should be of the same pitch for each spoke. If not, they are not uniform.

If the sound is duller than the others, chances are that the specific spoke is looser. Check the other spokes and count the number of threads that are visible as the spoke disappears into the nipple flush with the rim. Adjust this to match. If the sound is more high-pitched for a spoke, it probably is much tighter and should be loosened appropriately with the spoke wrench. With all of the spokes sounding similar, the chance of having a rim wobbling is reduced.

Should you have this wobble in your wheel–in which the rim does not revolve equidistantly between the fork legs through one revolution–the problem becomes more complicated and sometimes baffling. If the wheel wobbles to the left, the objective is to move it toward the right. This is done –unless the nipples are frozen in place–by loosening the spokes that attach to the right half of the rim, and tightening those that feed into the left half of the rim.

Adjust only a few of each to see what effect this has on the performance of the wheel. Sometimes it will compound the problem and, instead of having one noticeable wobble, you end up with a couple or more of lesser magnitude. Not all rims are perfectly balanced and will not always spin true.

The system does not work on the rear wheel, because those spokes are adjusted differently to account for the derailleur gearing mechanism on 5 and 10-speed models. Rather than fool around with these, take the rim to the bike shop.

Wheel Rim Checks

The wheel rims should be reasonably free of rust. If the bicycle is equipped with caliper brakes, the sides of the rim should be clean and free of any lubricants.

Tightening or loosening spoke: use spoke wrench to avoid damaging spoke nut.

Additionally, the rims should not have any noticeable dents or kinks which might interfere with proper seating of the tire.

Adjustments

If the wheel rims are badly rusted, dented or kinked, the bicycle should be teturned to a bicycle dealer for servicing.

TIRE PRESSURE CHART

TIRE PRESSURE CHART

SIZE	PRESSURE	SIZE	PRESSURE
27 X 1¼"	70 - 75	24 x 1.75"	40 - 45
26 X 1⅜"	55 - 60	24 x 2.125"	25 - 35
26 X 1.375"	55 - 60	20 X 1⅜"	55 - 60
26 X 1¼"	40 - 45	20 X 1¾"	40 - 45
26 X 1.75"	40 - 45	20 X 1.75"	40 - 45
26 X 2.125"	25 - 35	20 X 2.125"	25 - 35
24 X 1⅜"	55 - 60	16 X 1¾"	40 - 45
24 X 1¾"	40 - 45	16 X 1.75"	40 - 45
		16 X 2.125"	40 - 45

Figure 13. The tire size and recommended pressure are usually stamped on the side of the tire.

Tire Care

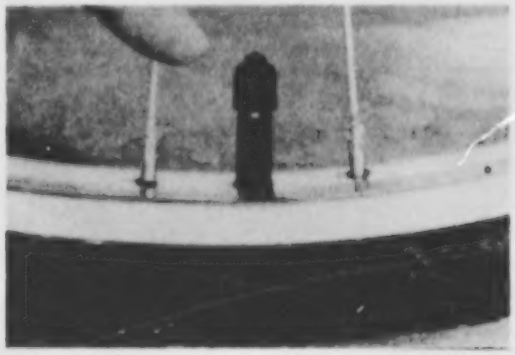
Is the pressure in your tires above or below the correct pressure range (Figure 13)?

You should check and correct your bicycle tire pressure at least once a week. Failure to keep the correct tire pressure will cause breaks in tire sidewalls. The correct pressure range is usually given on the tire. If it is not, you can use the following table as a guide.

Balloon tires . . . . . 30–35 psi
Middleweight tires . . . . . 40–45 psi
Lightweight tires . . . . . 50–60 psi

Are the tire valve stems pointing directly toward the center of the wheel (Figure 14)?

Figure 14. The valve stem should be exactly perpendicular to the rim, like the one below. If angled, it could be cut, which results in a flat tire.



If one of the valve stems is not pointing in the correct direction (Figure 15), remove the tube and reinsert it straight, following the directions for tire repair. A crooked valve stem will eventually lead to a flat tire.

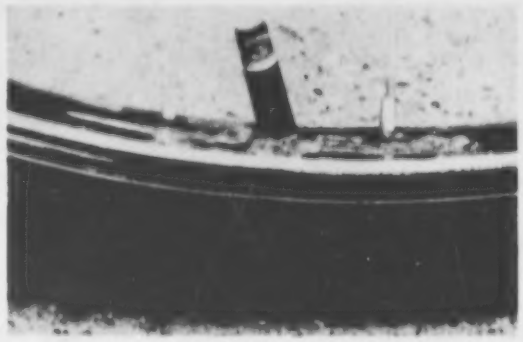


Figure 15.

Tire and Tube Repair

Most bicycle riders at least know the rudiments of fixing flat tires, just as most automobile operators know the tire changing sequence for their cars. Times have changed, however, and the near-indestructible balloon tire is not used with the frequency it once was, the narrow gum-walls being substituted. Many riders often do more damage than good, when attempting the repair of gum-wall tires.

Clincher tires—those with the rib or bead that fits into a groove on the rim and that utilize tubes—are much easier to repair than sew-up tires, which are cemented on the rim with a combination of glue and high air pressure. The latter has the tube sewn to the inner casing of the tire.

Before removing the tire from the rim, in the event of a slow leak, check to assure that the valve core is not the culprit causing the problems. Sometimes, if the core is not seated all the way, it will lose air. Drop a bit of soapy water or saliva into the core and, if it's the problem source, bubbles will form. In this case, try tightening the valve core with the valve cap that should be used to cover the stem. Again apply the liquid.

Emergency Tire Repair

Sooner or later, in spite of your best efforts, you may have a flat tire. If you do any long distance riding, it is a good idea to carry a spare tube or repair kit, a wrench and a hand pump.

How to Repair a Tire

1. Remove the wheel with the flat tire from the bicycle. NOTE: If you are removing the rear wheel on a derailleur bicycle, shift the derailleur onto the small rear sprocket.

2. Depress the valve core and be sure that the tube is completely deflated (Figure 16). Remove the tire from the wheel using care not to puncture the tube. Do not use screwdrivers to remove the tire. You can buy a set of three tire irons from your bicycle dealer for less than a dollar. These wrenches will make removing the tire much easier.

3. Repair the puncture in the tube with a good patch or replace the tube (Figure 17).

4. Examine the tire casing carefully before reinserting the tube. Make sure the casing is clean inside and free from breaks or other conditions which might injure the tube.

5. Dust tube with talc or similar material if available before inserting in tire. This is important to prevent tube from binding in the casing.

6. Examine rim carefully. It must not be bent. It must be free from rust and have no loose or rough spoke heads visible which could damage the tube.

7. Always use a rim strip (Figure 18). Be sure that the plastic rim tape (that surrounds rim to protect tube from spoke ends) is in place in center of rim.

8. Inflate tube until it just starts to regain its shape. Place tube in tire. Insert the valve through its hole in the rim and carefully mount the tire on the rim using your hands.

9. Inflate carefully to about 10 pounds pressure. Check to see that both beads rest properly in the bead seats and the rim line on the tire is visible all the way around the tire on both sides. Deflate the tube by depressing the valve core. This permits the tube to free itself, avoiding pinching and binding within the casing.

Figure 16. Depress valve core.

Figure 17. A tube patching kit is a must for riders that use tube tires, and is easy to use.

Figure 18. Use a rim strip.

10. Again inflate carefully to about 10 pounds pressure and examine tire, making sure that the beads are in place and the rim line is visible all the way around on both sides. Then inflate to the correct pressure.

11. Replace the wheel in the frame and tighten the axle nuts securely.

Tubular–To remove simply deflate and work off the rim with your hands. To replace the tire, since tubular tires must be cemented to the rims, the rim first should be cleaned with a solvent. While cleaning, check spoke ends to see that they are flush. Apply a layer of rim cement evenly with your finger or a small brush in the well of the rim–make sure you do not get cement on the outside braking surface of the rim.

Inflate tubular tire until it turns inside out and apply a thin layer of cement to the base tape. When the cement becomes tacky, reduce the pressure until the tire will just hold shape–then proceed to fit the tire as follows:

CHANGING TUBULAR TIRES

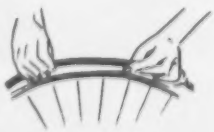
1. Stand wheel in upright position and insert valve through valve hole in rim.

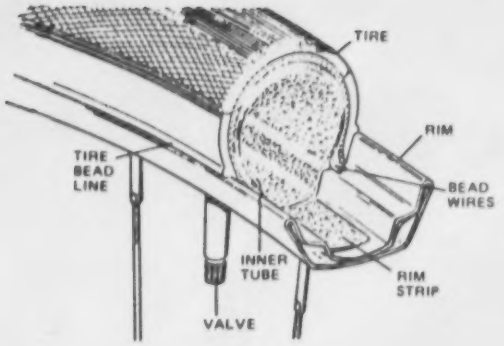
2. Holding tire firmly on both sides–stretch by pushing downward and work into position on rim.

3. Continue process as far as possible working to side of rim opposite valve.

4. Lift to horizontal position and stretch remaining portion into place–clean your hands.

5. Inflate tire further and seat correctly on rim–true by rolling in proper direction. If there are high or low spots, stretch the tire where there are lows. Now, fully inflate tire. It is advisable to allow 12 hours for drying before riding.





Wheels

Rear Wheel Removal–Shift into high gear (small rear sprocket). Loosen both axle nuts by turning in a counterclockwise direction. (If your bicycle has quick-release brakes, now is the time to release this unit.) If equipped with quick-release hubs, turn release lever 180 degrees to free. The wheel is now free to slide forward and out of the frame.

Rear Wheel Installation–Locate the top section of the chain on the small sprocket and replace the wheel in the frame by pushing back and centralizing between the chainstays. While holding the wheel in this position tighten the axle nuts in a clockwise direction. (Reset quick-release brake unit.)

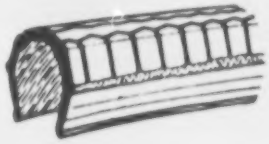
Front Wheel Removal–Simply loosen nuts with a wrench and lift wheel out. If you have quick-release hubs, turn quick-release lever 180 degrees. (Note: The quick-release lever should always be on left-hand side.) If cycle is equipped with quick-release brakes, release this unit before removing wheel.

Front Wheel Installation–This is the reverse of the removal steps. Some front hubs have adjusting cones. The adjusting cone has seats which should always be on the left side when viewed from riding position.

Common Types of Bicycle Tire and Tube Damage and Their Causes

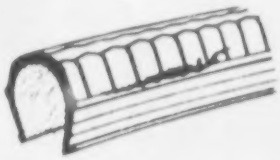
RUPTURES may be caused by running over objects such as curbings, sharp stones, and holes. DON'T JUMP CURBS!

CHAFING may be caused by crooked wheels, improper alignment of the wheel in the frame, bent fork, or improperly positioned generator roller. KEEP WHEELS ALIGNED!

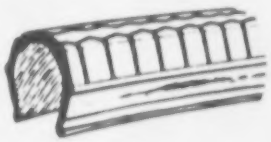


RIM BRUISE may result from running into or over curbs, rocks, holes or other objects when tires are under-inflated.

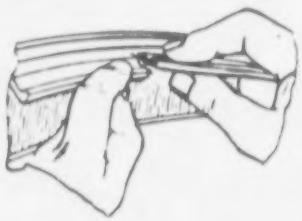
CUTS on tread or sidewall may be the result of running over glass, or other sharp objects. AVOID ROUGH STREETS AND ALLEYS!



RIM CUTS may be caused by rusty rims, overloading the bike, or riding on under-inflated tires. DON'T RIDE DOUBLE!

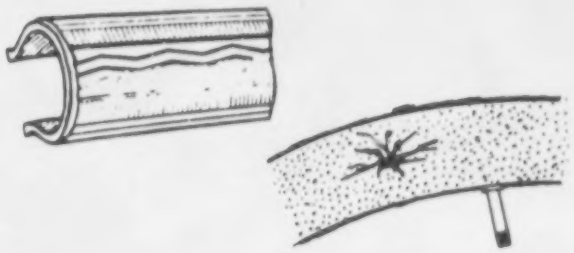


BROKEN BEADS almost always result from the improper use of tools to mount tires. USE HANDS ONLY TO MOUNT TIRES!



STAR BREAKS may be caused by running over pointed objects such as sharp rocks or metal. There is often no visible evidence on the outside of the tire.

UNEVEN TREAD WEAR may be caused by brakes that grab or lock the wheel, skidding stops, or by crooked wheels. AVOID QUICK STOPS!



BLOWOUTS frequently are the result of over-inflation. Blowouts may also be caused by the tire not being properly seated on the rim when inflated. If the tire is not seated properly when inflated, the pressure of the tube against the sides of the tire forces the tire off the rim blowing out the tube. If the tire is damaged in any way, causing a break in the smooth inside surface of the tire, this break may "chafe" or rub against the tube eventually causing tube failure.

DISTORTED TIRE CASINGS may be the result of letting your bike stand for long periods. If you're storing it for the winter, hang it up or turn it upside down. STORE YOUR BIKE PROPERLY!

Care for Your Saddle

Plastic Top Saddle–Saddles with a plastic top may be cleaned with warm water and soap.

Seats come in a variety of styles and materials. While they do look uncomfortable, scientific technology says they function best of all seats, with no comfort loss.

Leather Saddle–A good quality saddle in regular use will always retain its flexibility and shape and requires very little attention. However, after any lengthy storage or if the saddle top becomes dry or has been saturated with water, a good preservative will feed the fibres, and restore its suppleness. We recommend you use Brooks "Proofide" or an alternative is Neats Foot oil. It is a good plan to apply the dressing when the saddle is wet. A small quantity should be applied to both the top and bottom surfaces of the leather with a soft brush or cloth. Two or three light applications are better than one heavy one. Wet leather should never be dried forcibly, but allowed to dry gradually in a normal atmosphere.

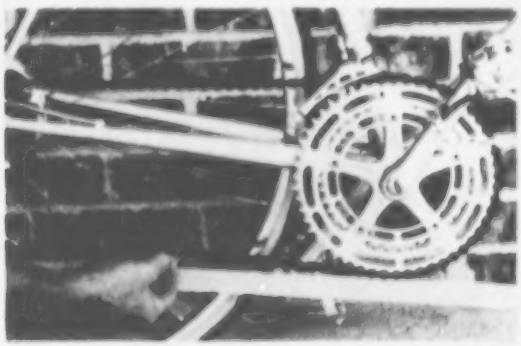
To prevent staining of clothes immediately after treatment of the saddle, a saddle cover should be used.

If it should become necessary, the leather top can be stretched more tightly by adjusting the nut in the front of the saddle, but this must be done with caution. Too many turns of the nut may pull the saddle out of shape.

Bicycle Chain Checks

A correctly adjusted chain should in the tightest position have about 1/2 in. up and down movement at center between chainwheel and sprocket. NOTE: This does not apply to bicycles equipped with a derailleur gear where the chain tension is maintained by the spring loaded pulleys.

To adjust chain tension–loosen rear wheel axle nuts, move wheel to obtain correct chain tension ensuring that wheel remains central between frame chain stays–tighten axle nuts securely. On three-speed models–re-set the gear adjustment after moving the rear wheel.



Bicycle chain links are rivetted together–should you experience any difficulties with your bicycle chain (e.g. stiff or damaged links) return to your dealer for service. He is equipped to remove and rivet chain links.

It is important to lubricate the chain regularly.

Chain Cleaning and Replacing

You can remove the chain yourself on one, two, and three-speed models, but five and ten-speed derailleur bicycles have chains without splice links and must be replaced by a bicycle serviceman.

Separated chain (above) is joined by employment of master link (below). The plate is clamped over two special roller links to hold the chain intact.

1. Loosen rear axle nuts to allow some extra slack in the chain.
2. Find the chain connector link.
3. Holding the chain in both hands, press your thumbs on both sides of the connector link to spring the chain toward the connector-link bar and loosen it (Figure 19).

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4. Pry off the link with a screwdriver and remove the chain.

5. Get a new chain or clean the old one. Be sure the new chain is the same length and size as the old one. Check them side by side. You can clean the old chain by soaking it in kerosene, fuel oil, or parts-cleaning solvent and scrubbing it with a stiff brush. Wipe it dry, oil it thoroughly with light machine oil, and work each joint until it moves freely.

6. Place chain on sprockets.

7. Insert the connector-link pins through the chain so that the bar will attach to its outside edge.

8. Press the bar onto the pins until it snaps in place.

9. Adjust the chain tension as outlined previously.

Difference in width of chain using master link (at left) and that needing chain tool is shown.

Coaster Brake Checks

Mounting nuts and bolts on the brake arm strap should be fully tightened. There should not be excessive pedal travel between engagement of the forward driving clutch and the brake. There should be no more than about 20 degrees of travel before the brake is engaged when the pedals are turned backwards. The coaster brake, when activated should bring the wheel to a quick stop.

Adjustments

Since, on a coaster brake equipped bicycle, the coaster brake is the only brake, there should be no question about the safe and sure operation of the coaster brake. If there is any question about the coaster brake operation, the bicycle should be returned to a servicing dealer for further checks and adjustments if necessary.

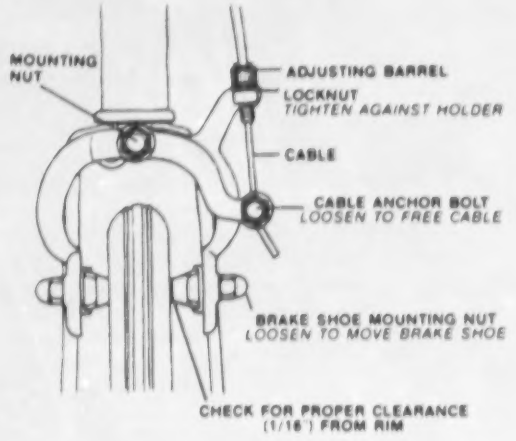
Caliper Hand Brake Checks

Make the following checks on caliper hand brake equipped bicycles.

The brake levers should not touch the handlebars before the brakes are fully engaged and the wheel is locked.

The caliper brake shoes should be centered over the rim and have no end play. Take hold of the brake shoes and see if the arms can be moved forward and backwards. If there is excessive play, the mounting nut should be tightened.

Check to see that the nuts holding the brake shoes to the arms are fully tightened.



Check to see that there is at least 3/16 in. of braking surface left on the rubber brake shoes.

Check to see that the cables are taut and there are no frayed ends.

Adjustments

If there is excessive lever travel or if the cable is loose this can usually be corrected by the built-in cable adjusting barrel. This is usually located somewhere along the caliper brake arms (or sometimes on the brake lever).

To tighten the cable, turn the adjusting barrel out of its holder until the cable is almost taut. Operate the hand brakes again to see if this corrects the problem of excessive lever travel and loose cables.

If there is no adjustment left on the adjusting barrel, turn the adjusting barrel all the way back into its holder and loosen the cable anchor bolt freeing the cable. Hold the brake shoes tightly against the rim and pull the cable through the cable anchor bolt. Fully tighten the cable anchor bolt and then check the operation of the brakes again.

If the caliper brakes are not centered properly over the rim and one shoe touches the rim, the brakes should be centered using the following procedure: the brakes are attached to the bicycle by means of a long bolt with one securing nut in the rear and two nuts in the front. Using the thin style caliper brake wrenches, turn the two front nuts against each other locking them and turn both wrenches in the direction

necessary to center the caliper arms over the rim. Also check to make sure that the rear mounting nut is fully tightened.

If the brakes squeal when they are applied, slightly bend the brake arms so that the front part of the brake shoe engages the rim first.

If the brake shoes are excessively worn, remove the brake shoe holders and the brake shoes. Replace the brake shoes and reinstall the brake shoe holders onto the arms making sure that the closed part of the brake shoe holder faces the front of the bicycle.

If the brakes operate very slowly or sluggishly, or if the cable is rusted or has frayed ends, the entire cable should be replaced. Since this requires quite a bit of time, the bicycle should be returned to a servicing dealer for removal, lubrication and installation of new brake cables.

Gear shift lever should be tight enough to hold the gear in selected position. Levers with a wing-type screw on the side of the lever work on friction. DO NOT LUBRICATE. If lever is not tight enough to hold the tension of the gear, tighten the wing screw carefully by hand. See your dealer for any adjustment or maintenance to levers with no wing-type friction screws.

Bicycle Multi-speed Controls Checks

If the bicycle is equipped with either three-speed or five-speed gears, check to see that the gear shift lever operates properly and that the hub or derailleur is functional in all of its gears.

Adjustments

Since there are a number of multi-speed hubs, controls and derailleurs currently on the market, it is impractical to give detailed adjusting instructions for all of the different types available. Any problem with multi-speed mechanisms should be referred to a servicing dealer for further checks and adjustments.

However, in case of emergency and for minor adjustments, the fault finding chart should help you. It is recommended that you work in the order given here.

Depending on the model you own, your cycle will be fitted with one of four different kinds of gears. Since they all operate on the same principle, the adjustment is basically the same.

1. Turn cycle over standing it on handlebars and saddle.

2. Rotate pedals to turn rear wheel and operate all gears to determine your problem. (Use chart for reference.)

Front Derailleurs

Front derailleurs are found on ten-speed bicycles and they control the shifting of the chain between the front sprockets. Their mechanism is simple, consisting of a guide that "derails" the chain from one sprocket to the other. It is important that the front derailleur be mounted correctly. Many shifting problems are traceable to improper mounting of the derailleur. The guide should be parallel with the sprocket and there should be no more than 1/8 in. clearance between the chain guide and the tips of the sprocket teeth. If the derailleur needs to be repositioned, the cyclist should loosen the mounting nut and shift the derailleur.

The front derailleur is equipped with two screws that will limit the chain guide movement so that it doesn't shift the chain off the sprocket. To set the low gear limit screw, the cyclist shifts the chain onto the smaller front sprocket and turns the low gear limit screw until the inner side of the chain guide just clears the chain. To set the high gear limit screw, he can shift the chain onto the large front sprocket and turn the high gear limit screw until the outer side of the chain guide just clears the chain.

Then he should check the operation of the front derailleur by turning the pedals and shifting the front derailleur. The chain should easily shift from one sprocket to another with a minimum of noise and clatter. Sometimes it helps to bend the front part of the inner side of the chain guide slightly inward to assist in shifting the chain.

To adjust the cable on the front derailleur, the cyclist shifts the chain onto the small front sprocket so that the cable is not under tension. He next loosens the cable anchor lock nut and pulls the cable almost taut with a pair of pliers. Then he retightens the cable anchor lock nut and checks again for operation of the front derailleur.

Rear Derailleurs

There are many types of rear derailleurs currently used, but their operation is basically quite similar. Just about all rear derailleurs have two pulleys housed in a spring-loaded cage over which the chain rides. These help to properly tension the chain as it is shifted from one size sprocket to another. The most common causes of shifting problems with the derailleur are falls, dirt, lack of lubrication, or improper cable adjustment. The first step should be a thorough cleaning of the derailleur, and then light lubrication at the pivot points. Too much oil will only attract dirt.

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Most derailleurs are equipped with two screws that control the travel of the roller cage that guides the chain. To set the low gear limit screw, the cyclist shifts the chain onto the second smallest sprocket and turns in the low gear limit screw until it contacts the derailleur to prevent further movement of the roller cage. Then he will shift the lever all the way forward, attempting to shift the chain onto the smallest sprocket. Next he turns the pedals and turns the high gear limit screw out until the chain just drops onto the smallest sprocket.

Then he loosens the cable anchor bolt to free the derailleur cable, pulls the cable taut with pliers, and retightens the cable anchor bolt.

It should then be possible to shift the chain onto the largest rear sprocket. He adjusts the shifting levers so the roller cage is directly underneath the large rear sprocket and adjusts the low gear limit screw until it just contacts the derailleur, preventing further movement of the roller cage. Then he checks the operation of the derailleurs to make sure they are functioning properly in all gear selections.

If the chain slips off the large low gear sprocket, the tension control on the shifting lever should be checked and tightened. Usually this will be sufficient to prevent the chain from slipping off the large sprocket by itself.

FINDING AND CORRECTING PROBLEMS

REAR

Problem	Cause	Cure	Comments
1. Shifting from gear selected without touching shift lever.	1. Improper tension on shifting levers.	Tighten gear tension lever screws.	Do not tighten so tight you are unable to shift. Do not lubricate as levers work on friction.
	2. Cable slip.	Tighten cable pinch bolt.	Insure cable adjustment is correct before tightening.
2. Chain throwing off the small sprocket toward frame or not riding on sprocket or not reaching small sprocket.	1. Incorrect setting of high gear adjustment screw.	Readjust.	Insure tension in gear cable is not acting as a stop.
3. Chain throwing off the sprocket toward wheel or not riding on sprocket or not reaching large sprocket.	1. Incorrect setting of low gear adjustment screw.	Readjust.	Insure that the chain never derails toward the wheel as extensive damage can be incurred.
4. Shift lever engages lever stop before low gear is obtained.	1. Too much slack in cable.	Readjust cable.	Insure cable is not used as a stop.

FRONT

1. Shifting from large to small chain wheel sprocket without touching shift lever.	1. Improper tension on shifting levers.	Tighten gear tension lever screws.	Do not tighten so tight you are unable to shift. Do not lubricate as levers work on friction.
2. Chain throwing off large chain wheel or not engaging chainwheel.	1. Incorrect setting of outer chainweel adjustment screw.	Readjust.	
3. Chain throwing off small chainwheel or not engaging chainwheel.	1. Incorrect setting of inner chainwheel adjustment screw.	Readjust.	

CHAPTER 10

SKILL DEVELOPMENT

This section will mainly help the instructor to teach bicycling the correct way, and it is largely up to the instructor to help instill a sense of responsibility into the students for treating their bicycles as vehicles and riding according to the rules of the road.

Instructors should start slowly and allow the students plenty of practice, especially at the beginning, so that they will have the confidence needed to tackle the more difficult exercises.

The actual physical area required for holding the cycling exercises is a large parking area, a closed-off street, a large indoor fieldhouse, or a gym floor. The lines and maneuver areas should be laid out with chalk, lime or whitewash.

These and similar exercises are being used in a number of ways. Not only are they used in civic and service groups in once or twice-a-year safety programs, but they are also being used as part of the lifetime sports program of many schools and colleges. In school situations, the exercises are most effective when demonstration by regular teaching personnel can take place.

This series of exercises, developed by experts with long practical experience, provides the best means available to measure and improve the skill of the individual cyclist under the variety of conditions met in every day cycling.

This skill development program teaches the cyclist the following:

1. The types of basic maneuvers, changes of speed and direction and the proximity to other moving and stationary objects that occur when cycling.

2. The handling characteristics, capabilities and limitations of the rider's bike when undertaking these maneuvers.

3. An awareness of the actions of other road users which affect his cycling.

4. The self-confidence, developed from knowledge and practice, that allows the cyclist to master traffic situations without panic.

5. The rules of safe cycling which, if followed, will keep him from causing a potentially dangerous situation.

The bike driver must be made to understand that safety is a two-way street. He must not only ride correctly himself, but he must also be able to correct for the poor judgment of others. He must become a defensive driver, knowing how to take care of himself when the "other guy" makes a mistake. To do this he must develop the ability to:

1. Recognize all road hazards.

2. Understand the best defense against these hazards.

3. Act in time and in a manner to avoid losing control of his bike.

Ideally, bike drivers should use their own bicycles, for it is this bike that he or she will be driving in traffic. Its capabilities and the driver's ability should be tested together.

The reason for each test and its practical application to road situations should be explained to the participants, and the test properly demonstrated. As previously explained, this helps make the tests more meaningful to the participants and they will see the tests for their practical value, rather than as some trick or stunt to be forgotten once the event is over.

This program of tests is designed to be given at a single session, or if more time is available to develop greater proficiency, it can be extended to two, three or even four sessions. With multiple sessions, it is possible to include such variables as road surface, hills, corners and intersections. Cornering in loose road material, how to cross car tracks, ankling, and the more efficient use of gears can all be included in the extended course. If the group develops sufficient skills, an actual road test in traffic will provide an excellent finishing touch, and greatly increased feeling of confidence and accomplishment will ensue.

EXERCISES

I. Mount and Dismount

Problems with mounting and dismounting occur in two different ways. First, the cyclist is unable to move in a straight, unwaving line. Secondly, the rider attempts to stop while seated and in doing so needs to put his foot on a curb or jump off the bicycle before he comes to a complete stop and falls sideways, because his feet will not touch the ground.

Purpose: To show how to start and stop without wavering.

Test: Straddle bike, one foot on the ground, the other placed on opposite pedal, pedal placed 45 degrees above the horizontal, hands on handlegrips. Simultaneously push off, press down on the pedal and raise body up and back onto the saddle. Pedal a few turns, then brake. When almost stopped, pull body forward off saddle, one foot on low pedal, opposite foot forward and down to engage ground as bicycle stops.

Significance: With proper saddle height, the inexperienced driver tends to start or stop while seated. Since his feet will not reach the ground, he tends to wobble into the traffic stream, or to fall to one side when stopping. If the pedal is not placed in the proper position for starting, insufficient speed may result in lack of control. This method gives full control at start and stop.

I., III., IV. Balancing–Straight Ahead With Control

Learning any type of physical skill activity requires practice. In the short period of time that will be allotted for these exercises, it is imperative that the students have as much practice as possible performing the various basic bicycling exercises that will be introduced to them. And since practice is the key to proficiency, the students will be kept moving continuously as they practice. After riding through a particular exercise, they will have a traffic pattern that will bring them back to the start of the exercise. This will not be a pattern that is laid out but they should be given advance instruction as to which way they will return to the beginning of the line so that the line is continuously moving and the students do not have to waste time by getting off their bikes and waiting.

All of the skill exercises are to be made initially at low speeds. The speed will be increased as the riders show an increased ability to handle their bicycles capably along the straight line. Occasionally one cyclist may need to be pulled from the line and given more personalized instruction. In this way he or she can learn faster and the rest of the group will not be slowed in their learning process. Always keep in mind that this is not a race, and safety and proficiency are being taught, not speed.

The ability to ride in a straight line relates to safe and proficient bicycling in several ways. First, the ability to ride in a straight line enables the driver to stay as close to the right side of the road as possible, thus not weaving into the center of the lane and endangering himself as well as the motor vehicles attempting to go around him.

Secondly, automobile drivers will see that the rider has control of the bicycle and will not feel a need to swerve into the left lane to pass.

Thirdly, the cyclist will need to be able to ride in a straight line as he glances over his shoulder and looks for traffic, shifts gears or signals when making turns.

Finally, as the bike driver gains the ability to ride in a straight line he will be conserving energy because any wobbling or excessive movement uses up needless energy. The competent cyclist needs only two feet or less of road space, especially if there is no curb.

In starting this test, the students should make sure that there is adequate space between each rider . . . five feet or more. By keeping the riders a good distance from each other, they can concentrate on handling their own bikes instead of worrying too much about what is going on in front of them or behind them. They will be able to adjust to riders or cars in front or in back of them only after they have learned to handle the bicycle adequately in a straight line.

It is especially important for them to achieve some degree of success initially because this will give them the confidence that is needed to achieve success with the more difficult riding chores.

After the group becomes reasonably proficient at riding in a straight line, they should attempt to do so while occasionally glancing over their shoulders, as they would in traffic or when preparing to make a left turn, or before swerving around a parked car or some obstacle in the road.

The third step in this sequence will be to have the group ride in a straight line and, after glancing over their left shoulders, to "check for traffic," signal to make a left-hand turn. Shifting while riding in a straight line should be practiced. Practice this exercise until you are satisfied the students can ride in a straight line with assurance when they go into traffic.

II. Balance Test

Purpose: To test the primary sense of balance.

Test: Coast for 40 feet on a straight line not more than 4 in. wide, with the left foot on the left pedal and the right foot pushing the ground on the left side of the bike. The cyclist stands erect with both hands on the handlebars, but not sitting in the saddle. Repeat the test using the right foot on the right side pedal and the left foot pushing.

Significance: Riders can develop a sense of balance as well as a sense of momentum of turning. The test emphasizes and makes clear how a slight swing of the front wheel serves to reinstate the cyclist's balance when he or she starts to topple. It trains for straight riding.

III. Traffic Awareness at Start Up

Purpose: Proper observation of traffic and obstacles prior to starting.

Test: When the test has been satisfactorily accomplished, repeat, but with the cyclist to observe over his or her left shoulder for traffic to the rear prior to start up, and 180 degrees to left and right upon starting. A traffic cone placed in the line of travel 20 feet in front of the starting point is used to represent a parked car.

Significance: When starting into a stream of traffic, it is necessary to take note of traffic approaching from the rear, and for pedestrians or parked cars that may require an immediate veering of path into overtaking traffic.

IV. Riding the Straight Line

Purpose: To establish the ability to drive in a straight unwavering line in the street, adjacent to the road edge, while signalling or gear-shifting, and while observing traffic.

Test: This test utilizes a painted or chalk-outlined straight line of 100 feet or greater length, and about 4 in. in width. A return path to the starting point is provided along a road edge, curb, or parallel line.

Drivers in continuous procession travel within the confines of the 4 in. line, return along and within 10 in. of the road edge to the starting point. The test is repeated in continuous flow until the drivers can stay within the line and close to the road edge. Then riders are directed to remove first the right hand, and next the left, while maintaining the path width as before. Practice giving traffic signals. Continue on the same path, with riders observing over the left shoulder for traffic to the rear, again without leaving the confines of the painted line.

Significance: For efficient cycling, the prime requisite is the ability to maintain perfect balance without a wavering path. The ability to drive a straight line permits the cyclist to maintain a position close to the road edge, out of the stream of traffic approaching from the rear before making many maneuvers, without steering off the road or into traffic. Signalling or gear-shifting require removal of one hand without disturbing equilibrium.

V. VI. VII. VIII. Turns

Since it is desired that the action be continuous, two curves (one to the left and one to the right) are added to the previously mentioned straight line course. These curves, each with a 10-foot radius, permit continuous action, further practice on the straight line and a new test of changing direction of the bicycle by turning the handlebars and shifting the rider's weight first to one side and then the other. The instructor should give a demonstration of how the weight is shifted going into a turn and how the handlebars are turned at the same time.

A lot of the student's ability to turn will be gained by "feeling" for himself how turns are made, and this can only be gained through practice.

In day-to-day cycling, there are frequent instances when it is necessary to swerve to avoid a pedestrian, car, pothole or some other object in your path. This must be done in a precise manner so that the cyclist does not lose control. This exercise will develop confidence in the student's ability to control the bicycle over an exact desired path. The front wheel should follow or keep just inside the curves as the exercise is practiced. When it is repeated at an increased speed, the task requires greater skill. Do not ask the cyclists to increase their speed, though, until their ability at slower speeds has been proven and they have confidence in what they are doing.

The next step in learning to turn will be to cycle through a course that has sharp turns instead of the wide turns that have been used to acquaint the cyclist with the rudimentary procedures for turning a bicycle. Set up small rubber markers in a slalom course. Each marker should be approximately 2 feet from the center of the course and 10 feet away from the next marker.

V. Maneuver and Change Balance

Purpose: To test balance and related sense of momentum, and the changes in balance required by intended changes in direction.

Test: Ride, in a continuous stream, three or more times around an "S" shaped course of approximately 9-foot radius of turn. The front wheel of the bicycle is to be kept on or within 6 in. inside the line at all times.

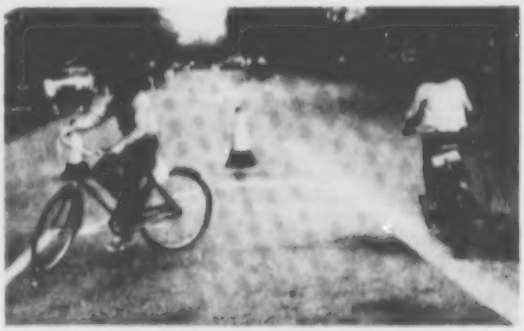
Significance: When cycling there are frequent instances calling for a swerve to avoid a pedestrian, a pothole, an oncoming vehicle. This must be done in a precise manner so that the bicycle will go where its driver intends. It becomes necessary at times to dodge a series of obstacles, involving shifting balance from one side to the other. This test develops precision of driving and confidence in the ability to control the bicycle to the exact desired path.

VI. Short Radius Turn

Purpose: To test the ability of the driver to turn his bicycle around easily and smoothly within a limited area.

Test: The cyclists travel along a marked lane or curb at the left side of an 11-foot-wide lane, turn clockwise to a set of markers indicating the opposite side. They proceed along the markers to opposite the starting point, and then turn clockwise to the opposite side of a second lane.

Significance: A cyclist is often called upon to turn around in a narrow street or constricted area. The successful completion of this test involves: (a) touching neither foot to the ground, (b) touching neither border line with either wheel, (c) making smooth and easy turns, and (d) not using brake excessively.



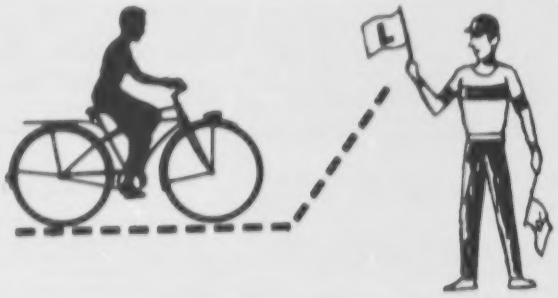
VII. Quick Direction Changes by Sight

Purpose: To establish ability to change direction quickly, under full control.

Test: Advance in a straight line. When one of three persons in front and 45 degrees to the left or 45 degrees to the right waves his arms, the cyclist is to veer sharply in no more than a wheel length's advance and proceed in the indicated direction without mishap. Try several times at different speeds for signs from each of the three signallers. Signals will be silent.

Significance: Because traffic has a way of shifting pace and direction suddenly, bicycle drivers should realize just what such changes require of them as cyclists. This test emphasizes (a) the speed of their own reactions, and (b) that they cannot always anticipate exactly when those shifts are going to occur. It demonstrates the merits of alertness to the shifts in the traffic picture, enabling the rider to make his own moves with greater sense of control.

The rider should be cautioned in advance that a sharp turn is made by leaning the bicycle in the direction intended, and looking in the direction in which the turn is being attemped. To do otherwise invites loss of control.

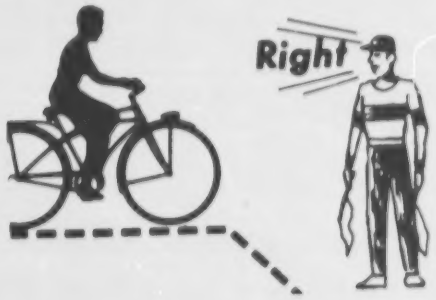


VIII. Quick Direction Change by Sound

Purpose: To establish the ability to listen for traffic sounds on all sides, and to react in accordance with sounds heard.

Test: With instructors located on both sides of the cyclist's path, as he/she advances in a straight line, a whistle or horn signal is given at a time after the cyclist has passed, followed by command "Ahead," "Left" or "Right." The cyclist veers sharply or proceeds, turning sharply in the direction called within one bicycle length. Try several times with different commands at increasing speeds.

Significance: In traffic and at all times on the road, a cyclist unconsciously listens for the tell-tale sounds of traffic approaching from front, sides, and rear. Ability to do this is aided by regularly inclining the head so that the ears are rotated a bit toward front and rear. This enables the cyclist to judge the direction and speed of approaching traffic from all directions. The ability to prepare for necessary rapid maneuvers, and additional practice in making rapid turns, is learned in this test.



A final practice session for turning will be a new slalom course that has the markers placed at random distances from the center of the course and from each other. It is expected by this time that the students will have a good amount of control of their bicycles and will be able to maneuver through a course that will require different speeds and different shifts of weight and turning angles. This is intended to simulate the type of driving that must be done out on the road as the conditions and obstacles in the way will vary considerably. As the students get accustomed to the course that you have laid out, you may want to change it and provide "new cycling conditions" for them to drive through.

This final exercise can also be varied by asking the students to point down at the markers as they pass them by. This would give them practice for group cycling because it is very important for members of a group that are driving in single file to point out glass, chuckholes or any other object that the bicyclists should avoid driving over and by pointing them out each succeeding cyclist will have time to avoid them.

Even though the students are not quite ready to go out onto the road for their final exercise, now is a good time to impress upon them the necessity of driving defensively. One very important factor in driving defensively on a bicycle is to listen for warning signs such as a squealing tire ahead, which would caution you to slow down, or a car engine behind you that would warn you to stay over to the right as far as possible. Your eyes are naturally important as well as they look for people getting out of parked cars or a car signalling to turn in front of you when the motorist is not aware that you are near the right side of his rear bumper.

IX. Avoiding Obstacles

Purpose: To establish ability to miss objects in one's path.

Test: Drive 40 feet minimum on a straight path 6 in. wide flanked at 6-foot intervals on alternate sides with weighted 1 lb. cans or fist-sized stones, without touching the stones.

Significance: Hitting or missing an object in the road, whether it is a stone, a hole or a pedestrian, is a problem of instinct. A cyclist hits an obstacle because he or she is watch-

ing it, and naturally steers where he/she is looking. If the cyclist looks instead at the clear strip to the side of the obstacle, the object can be passed over and missed.

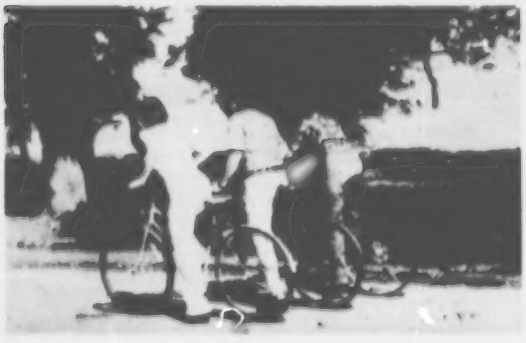
X. Massed Side-by-Side Start and Ride

Purpose: To learn to control the bicycle with objects in close proximity on both sides, to develop precision in keeping abreast of traffic.

Test: Line up a group of cyclists side by side, with 12 in. spacing between handlebars. Upon signal, start all together, maintain side-by-side alignment, and stop. Realign, and repeat. The distance for each stop should be 100 feet or more.

Significance: In the initial straight line tests, the cyclist should concentrate only upon himself. In traffic, one's peripheral vision is used to detect and avoid objects on each side, without distracting attention from the road ahead. This test gives confidence in handling this situation, without striking a solid object while learning to cycle in close proximity.

Maintaining alignment gives practice in using peripheral vision.



XI. Maneuver in Groups of 16
Traffic Awareness

Purpose: To establish the ability to cycle with traffic at sides, front, and rear, and to maneuver in conjunction with the moves of traffic.

Test: A group of four or more rows of four cyclists wide start, accelerate, turn, slow down, and stop—under the command of a leader in the first row or one riding beside the group. Change direction at least five ways with the group constantly maintaining close spacing and alignment both side-by-side and fore-and-aft.

Repeat, exchanging inside and outside rows, and front and rear riders, so that all riders get a turn at the inside position.

Significance: This test seeks to develop the awareness of the bicyclist of other traffic. The rider is absorbed in his riding, trying to keep his position under varying pace and direction, and under conditions that do not beset an autoist. The cyclists are forced to maintain pace and distance in relationship to other traffic, or else the formation becomes ragged and spread out.

THIS TEST IS NOT CONSIDERED AS APPROVAL FOR GROUP RIDING ON THE STREETS. Cyclists on traveled streets must maintain a path in single file at the road edge.

Controlled and Emergency Stopping

The ability to stop a bicycle with control is one of the most important abilities relating to bicycle safety. Sudden, sure stops will have to be made because of stop lights, pedestrians stepping out in front of you, cars cutting in your path, dogs getting in your way, and numerous other reasons. Other people will not be watching out for the cyclist very much, so the cyclist must be alert for situations that will require him/her to stop, and then exhibit the stopping ability that has been gained through practice.

The controlled stopping exercises will help the student learn the right timing and amount of pressure that is needed to stop exactly where desired. The first part of the exercise will be accomplished by driving up to a line that is across the main straight line and stopping as close to it as possible. It is important to keep a good distance between each cyclist as

they participate in this exercise. As the cyclists become more proficient it would be good to recommend that they increase their approach speed before they brake.

The second part of this exercise requires that the cyclist stop next to one of the instructors who will be situated about 3 feet from the straight line path. This will simulate the kind of stop required when something is seen out of the corner of the eye or slightly ahead and to the side which will probably cut in front of you. The instructors need to make the cyclists aware that in an "emergency stop" there will be a tendency for the bicycle to go into a skid. This is especially liable to happen if the cyclist's weight is off the saddle and forward. The students should be instructed to keep their weight on the saddle and try not to turn the handlebars even slightly from the straight-ahead direction.

It is unlikely that the whole group will have an opportunity to practice abrupt stops in the rain during this course, but they can at least be made aware that it will take longer to stop in the rain, especially when their bicycles are equipped with caliper brakes.

Pressure must be applied to the brakes much sooner in order to stop in the rain. This can only be learned by actually doing it, so suggest that each student practice braking in the rain on a little-used road at the first opportunity.

Another condition that might not be available for practice is for downhill driving. It is also especially hard to stop when going downhill, and this should be practiced by your group, as a group, if the local terrain permits. Emphasis here should be given to the heavier students so that they realize that it will be especially difficult for them to stop going downhill, since the force of their weight and the speed that they will probably attain going downhill hinders their ability to stop quickly.

Small rubber markers are used so that if a student does hit one of the markers she or he will go over it without falling.

XII. Emergency Stop

Purpose: To learn change in balance and capability of equipment for stopping in an emergency.

Test: Drive directly toward a board or edge (not a solid wall or curb), with speed, and stop with the front tire just in front of the obstacle. Repeat, as the "feel" of the bicycle is understood, at increasing speeds. The wheels must not be skidded. NOTE: This test may be done simultaneously side by side with several cyclists.

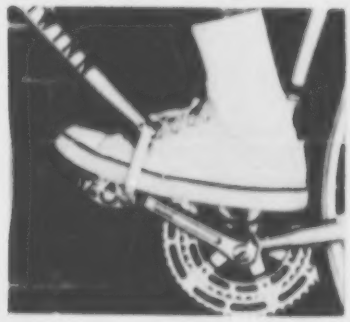
Significance: In the same way that the distance required to stop a car increases with speed, the distance required to stop a bicycle also increases. Frequently bicyclists must stop in an emergency manner, due to an on-coming car, a turning car, or a pedestrian who steps off the curb in their path. Sudden stops cause the weight to shift forward, allowing the bicycle to skid and lose control, or to pitch the cyclist over the handlebars. It is necessary to learn to shift weight to the rear, to avoid loss of control in a skid. Through practice, the cyclist learns his capability in stopping before the bicycle collides with an obstruction.

XIII. Riding Efficiency

Purpose: To teach how to pedal and to accelerate efficiently, using the ankles.

Test: Cyclists, in steady sequence, start as in test III. Special attention is given to the correct position of the foot—the ball of the foot being on the pedal. The pedals are "caressed" around, tilting the foot upward on the rear stroke, and downward and back at the bottom of the bottom stroke to obtain a smooth and uniform application of power throughout the pedalling circle. Drive for 100 feet and return and repeat until this technique is learned. Pedalling with one foot removed will demonstrate the ability to provide power over the top and bottom dead centers. NOTE: proper saddle position—test I, is a prerequisite for this test.

Significance: Smooth, efficient cycling with minimum effort requires a smooth application of power. This is of particular importance when climbing hills, at higher speeds, and assists greatly to ride a flawlessly straight course on the road. It is the hallmark of the skilled cyclists.



XIV. Controlled Stopping Ability

Purpose: To establish the ability to stop where desired—at a street corner, stop sign, or walkway.

Test: A line is drawn on the roadway about 60 feet from the starting point, and a simulated STOP sign placed at the curb line opposite the starting point. The cyclist mounts, rides at normal speed toward the first line, braking in a manner to stop with the front tire within three inches of the line. He or she then proceeds, turns about, and stops with the front tire just opposite the stop sign. Repeat.

Significance: This test enables the cyclist to determine the method of applying foot pressure to the rear pedal, if coaster brake is used, or finger pressure if hand brakes are used, in a manner to stop at a precise spot. It may be necessary to stop to avoid debris on the road, or to stop at a predictable location at a traffic crossing.

SUPPLEMENTARY TESTS

The preceding tests can be accomplished in a single session. It is possible, however, to instill additional confidence and to impart greater skill in the basic maneuvers by extending the time allotted, giving only part of the tests each day. Additional practice on each test, and the use of higher rates of speed as skill develops, makes a closer approach to the actual conditions occasionally experienced on the road.

Other variables encountered can be included in the supplementary experiences.

1. *Variation of Road Surface*—to include brick, cobblestones, car tracks, potholes, and loose material, affects handling of the bicycle and supplementary exercises can be given on the surfaces, utilizing tests III to XII.

2. *Grades and Inclination: Downgrades*—greatly affect bicycle handling and braking. Speed is attained more rapidly. More braking effort is required at a given speed, while the weight transfer from rear to front is more pronounced, leading to greater likelihood of rear wheel skid and noseovers. Downhill braking and turning exercises are recommended, tests V to XII inclusive.

3. *Upgrades and Hillclimbing*—use of speed-change gears. The cyclist will encounter hills of varying steepness in his normal cycling experience. Climbing of hills with ease in any gear, and the use of speed-change gears to reduce effort is an art, requiring smooth, complete circle application of power (test XIV). Avoidance of wobbling and unnecessary body motion, the teaming of leg, arm and back muscular effort for minimum fatigue requires practice. Emphasize straight-line riding. Proper timing in the use of change gears, and selection of the gear to be used for each condition is valuable training.

4. *Rain, Mud, Slippery Surfaces and Loose Gravel*–Rain and mud adversely affect the stopping ability of a bicycle in several ways. Brake efficiency itself may be impaired; tires skid more readily, further reducing stopping ability; sideslip is more likely. When turning and maneuvering, slip and loss of control occurs at lower speeds than when riding on dry surfaces, or hard surfaces. Repeating tests V to XII on less favorable surfaces is a valuable adjunct to the basic course.

5. *The Opened Car Door*–The malpractice of a motorist opening the door of his car into the face of passing traffic is so common that it is recognized by many state vehicle codes. On busy streets, a cyclist must not drive far enough out into the traffic stream to be beyond the range of a suddenly opened door. A very effective test has been used to develop this phase of "traffic awareness."

   A line of cars is parked along the side of the testing area, with an instructor in each of several cars in the line. The group to be tested rides in a single file along the line of cars, watched by the instructor through rear-view or side mirror. At irregular intervals, as a bicycle approaches, the instructor opens the left-hand car door a few inches to simulate a sudden, wide-open swing. The rider takes necessary action–emergency stop, maneuver, or both.

   The instructors use large, door-sized paper cartons (bicycle cartons are ideal), and stand facing ahead in the spaces between the parked cars. The cartons, representing doors, are rotated outward in the face of the cyclists at irregular intervals, giving the rider an opportunity to take the required action.

   Obviously, this test must begin at low speeds. Doors must be opened only far enough to provide the desired effect, without endangering the cyclist. Cyclists should be instructed to note when passing parked cars for the presence of persons on the cyclist's side, and if present, for movements of body or shoulder that precede an actual door opening. He must be aware, by listening, of approaching traffic from his rear, so that he will not maneuver into the path of an on-coming vehicle.

6. *Actual Road Test*–The piece de resistance that will demonstrate how well a group of cyclists have mastered the safety and proficiency lessons learned in the basic and supplementary tests is an actual guided trip on the open road, in progressively more difficult conditions. While instructors may accompany the group in automobiles, control and correction of deficiencies can be far more effectively accomplished by skilled cyclist instructors cycling with the group.

   The route to be selected should start on level, traffic-free streets. Corrections must be made firmly but constructively. Under the pressure of being "on his own" it is common for a cyclist to waver into the traffic lane, to ride an errant path, to mount and dismount incorrectly, or to brake improperly.
   If available, an up-hill and down-hill section should follow, where performance in hill-climbing techniques and in down-grade braking can be checked. Stress must be placed on each cyclist maintaining a straight course and keeping to the far right side of the road at all times. Care must be taken at intersections to see that the cyclists cross carefully in small groups without obstructing traffic. All traffic signs and lights must be observed strictly.

   At this point a critique is desirable. Those whose road performance does not meet safety standards must be weeded out for further off-street instruction. The cyclists should be instructed to stay together in closely-spaced groups, in single file. Normal errors of motorists that affect the cyclist should again be reviewed, such as opening doors, turning right in the face of a cyclist after overtaking him, a left turn by an oncoming car in his path, pulling out of parking spots or into driveways or filling stations.

   The groups may then proceed on to streets with greater traffic flow, and if performance is satisfactory, onto streets with faster and more dense traffic. It will be discovered that a well-disciplined group of cyclists, riding smoothly out of the path of the motorist, receives courteous treatment from motor traffic. Attainment of this knowledge by personal experience is the major reward to be obtained from the entire course. It is earned by the attainment of cycling proficiency.

The following check list can serve as a guide for the instructor to follow in order to make a complete survey of each cyclist's abilities and driving habits:

fails to use hand signals–
wobbles when mounting bicycle–
cannot ride a straight line–
lacks control in turns–
stops poorly–
ignores rules of the road–
does not keep a safe distance from rider in front–
improper dismount–
fails to look for traffic before entering main traffic flow–
bicycle in unsafe mechanical condition–
looks down when shifting–

After the ride, each student should be made aware of any glaring inadequacies and be encouraged to practice to make up these deficiencies. A final emphasis on bicycling safety should be given as the students should now be prepared to more safely and enjoyably bicycle on the streets and roads of their communities and the nation.

CHAPTER 11

HAZARD RECOGNITION, RISK ASSESSMENT AND DECISION MAKING

Within any activity there are certain hazards inherent to performing the activity safely. Recognition of those hazards and the degree of risk involved is important in making the correct decisions for continued performance of the activity. A person's attitude, skill and knowledge–along with experience of performing the activity and recognizing the hazard–will help in determining the risk one is willing to take in order to perform the maneuver safely.

ACTIVITY – HAZARD – RISK
(Attitude, Skill, Knowledge and Experience)
=
SAFE ACTIVITY

Search and scanning skills through the skill development exercises will be increased. Class activity involving perceptual development film strips or slides will also help increase these skills.

The accident types and situations should be learned along with increasing the memory bank of potential hazards in specific situations a cyclist will encounter.

The hazards that may be encountered should be related to include the recognition of one's own capabilities in relation to the reasonable level of risk acceptance, assessments of speed, gap, distance and space judgments in relation to the collision potential should be a major part of the skill development program.

A strong emphasis on the selection of the best possible maneuvers for accident avoidance in specific situations as indicated by the accident types and on decreasing the time needed to decide upon a specific action in normal driving or under emergency stress will help develop decision-making skills.

Throughout the individual sections of this program guide are information and activities that will contribute to the development of risk assessment and decision making. During the entire learning process, assessing the risk involved and making the proper decisions should be emphasized. Techniques of separating, compromising, and minimizing in the driving task should be established along with the I.P.D.E. Concept (Identify, Predict, Decide and Execute).

Hazards

The increased traffic on the roadways presents any driver with a number of hazardous situations, especially under adverse or unusual driving conditions. Some of these problems are shared by all motorists; others are unique to the bicyclist.

There are many hazards inherent to bicycling in the normal traffic flow patterns of our highways. These will not be listed here as they are encountered and dealt with throughout the guide. For example, the hazards met on left turns, intersection travel, lane usage, and other normal traffic hazards are dealt with in those specific situations.

The following hazards are those unique to the cyclist and are listed to draw to the cyclist's attention these specific situations and to minimize the risk when he or she is confronted by them.

Unstable Surfaces

Anything that reduces the amount of friction between the bicycle tire and road surface is a hazard to the cyclist. Whenever the road is wet, the danger of a fall increases. Wet leaves are especially slippery. Even when dry on top, they may be wet and slippery underneath.

Sand, gravel, oil spots, railroad tracks, and bridge expansion grates are other examples of unstable surfaces that present traction problems to the cyclist.

When approaching such surfaces, the cyclist should steer as straight a line as possible. The cyclist should avoid braking and sharp turns, and coast through if possible, or apply power gently.

The bycyclist should remember, too, that when caliper brake pads are wet they lose their effectiveness. In wet weather the driver should begin braking early.

Sewer covers with longitudinal grids are a real hazard in city cycling. Many of these drains are designed with sufficient space between the gratings to permit a bicycle wheel to drop down between them, resulting in a sudden over-the-handlebar stop.

Dogs

For some reason, many dogs (including those that are normally well-mannered) will chase bicycles. Most of the time they are chasing the pedals or wheels that are going around, not the driver. In trying to avoid a dog, the bicyclist may swerve into other traffic or hit some obstruction. In snapping at the bicycle's tires or the rider's heels, the dog may run into the bicycle, creating an additional hazard. Kicking or taking a swing at the dog with a tire pump or some other object usually does not meet with much success. In the process the bicyclist may lose his balance. Some of the measures the cyclist can take are:

- Avoiding the area where the bicycle-chasing dog lives.
- Yelling or screaming at the dog and trying to scare him back into the yard. Saying "no," or "go home." A freon-powered horn will scare most dogs away.
- Getting off the bicycle and standing with the bicycle between the dog and the cyclist. This is an important consideration, especially if the driver is overtaken or ambushed from the front. The cyclist should stop before the dog stops her or him. Contact against the front wheel by even a small dog can cause a fall.

- Using a dog repellent. Commercial repellents like those used by mail carriers are available, and will discourage almost any dog. The repellent should be squirted toward the dog's face.

Crosswinds

Strong crosswinds can push the bicyclist off course badly or cause loss of control. This may happen on high bridges, where hills or ridges channel winds through a valley, or on days of high and gusty winds. Some highways have signs indicating where strong crosswinds are known to occur. The cyclist should watch out for fast moving trucks and trailers which create a sweep of wind that can cause loss of control or even throw the cyclist from the bike. Such vehicles can usually be heard as they approach. If they are moving rapidly, the cyclist should get off the bike and wait until they pass, especially on two-lane roads.

Sun Glare, Hill Crests © JF

If you can be seen for an adequate distance and if you follow the course of the road without turning out into traffic, it is reasonably safe that you will not be hit from behind.

But when the overtaking driver cannot see you he will not steer around you, so in places of difficult visability you must go right on the roadway as far as possible. When riding towards a low sun you are concealed in sun glare, so ride as far over as you can get whenever you hear a car behind you, and don't turn left for chuckholes.

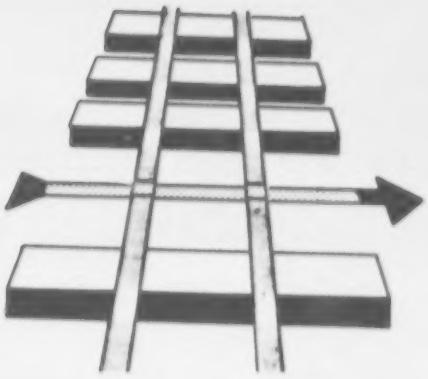
When riding on the crest of a hill you are concealed for the first part of the descent, so don't move away from the edge of the road as your speed increases until you are far enough down the hill for a driver to see and avoid you.

Curbs, Chuckholes and Railroad Tracks © JF

Hitting any sharp edge across your path—like a curb, large stone, railroad track or the far edge of a chuckhole—can fold your wheel, damage wheel rims, spokes and bicycle forks and/or dump you.

The popular lightweight bicycle, the type most frequently purchased by adults and designed to run on narrow-tread tires, rides well only on pavement or smooth, hard surfaces.

Whenever you see a sharp edge ahead, first try to dodge it, providing it is safe to do so. Go around chuckholes. Never climb curbs. When crossing railroad tracks look for the most level place to cross.



Cross railroad tracks at a perpendicular angle so your tire doesn't slip on the rail or drop into the slot causing a spill. Wet railroad tracks are very slippery.

If you can't dodge a sharp edge, brake hard to slow down. The slower you go, the more time your wheel has to climb over the edge and the less the tire will be flattened to the rim.

As you approach a sharp edge, stop pedalling with pedals horizontal and lift yourself off the saddle. Relax arms and legs and try to lift the bike with a sharp jerk upward. Get the front wheel over at all costs, and hope for the back wheel to get over.

Slots and Ridges © JF

Any slot or ridge diagonal or parallel to your course can steer your front wheel out from under you.

If your front wheel touches a ridge and gets turned, apply a firm force to the handlebars to steer it in the opposite direction. Prime concern is to consciously plan for such areas and avoid riding parallel on them. If you can't cross it at right angles, but you see the ridge early enough, jump the front wheel over it.

Slots and edges are found in many places: the drain grate facing parallel to your travel, drain slots in the road, the ridge between driveway and road surface, or between road surface and gutter, railroad tracks, and grooves between sections of concrete highways and shoulders when you have gone off the shoulder and are trying to get back on the roadway.

Car Doors

Watch ahead for people in the driver's seat of parked cars. All too often people in parked cars do not take a complete look around before opening the door, do not look at all, or misjudge the speed of the approaching bicycle. Be prepared to stop, because if you suddenly swerve into the center of the lane it may cause a collision with an overtaking vehicle, and guess who loses then? If you do have time to slow down before turning out to avoid a car door, look over your shoulder to see if there is any traffic close behind. Of course when road space allows it it's best to ride at least 3 feet from parked cars.

Keep close watch on cars parked ahead, and try to anticipate motorist's actions.

Cars pulling away from the curb present similar problems, especially when they don't signal their intentions. When the cyclist sees or hears a motor running, he or she should be prepared for a car to pull out.

Proper Clothing

Unguarded bell-bottoms or pants with flared cuffs should be avoided. These can easily become entangled with pedals, drive chain, sprocket or other bicycle parts.

Unguarded cuffs can cause accidents!

Many motorcyclists wear approved protective headgear. Many bicyclists feel that this is also an appropriate safety measure for the bicyclist. Although a motorcycle may go faster, the bicyclist can still strike his head against concrete pavement, a curb, a car, or other unyielding surface.

Nighttime Driving

The majority of collisions between bicycles and motor vehicles take place during daylight hours, but studies have shown that nighttime accidents are more severe. The problem is that the motorist cannot see the bicyclist.

Bright-colored clothes worn during daylight hours make it easier for motorists to see the bicycle rider. For the same reason, white or reflective clothing is strongly recommended for nighttime wear. But even with those precautions, it is still necessary to be extra careful at night.

CHAPTER 12

STORING AND SECURING

Bicycle theft is a serious problem everywhere. Carelessness on the part of the cyclist creates many of the opportunities for bicycle theft. Bicycles are often left unattended and unlocked in the streets. This indifference on the part of the owner turns to intense concern when the bike is stolen.

School yards are prime targets for bike thieves who raid them during class periods when no one is around.

A thief likes no sight better than this: bicycles around with no owners in sight. Housing tracts provide prime hunting grounds for bold thieves.

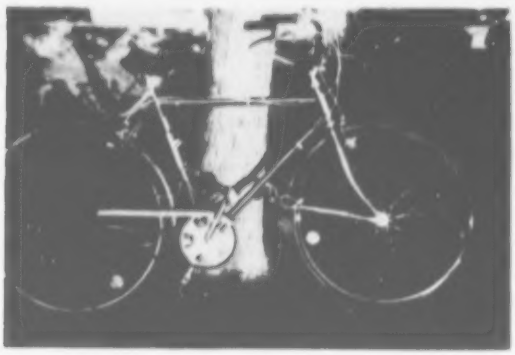
Unlocked bikes in front of libraries and similar buildings are oftentimes not there when the owner returns.

While there is no way to make a bicycle absolutely burglar proof, the cyclist can take certain reasonable precautions.

Lock the bicycle to a stationary object with a chain. Run the chain through both wheels and the frame as high off the ground as possible. If you only chain one tire to the frame, you might return to find the other wheel gone.

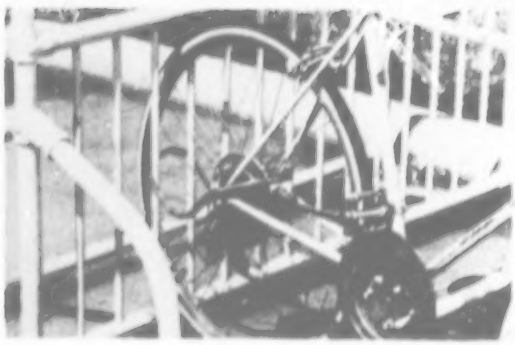
- Use a high quality lock and case hardened chain.
- Lock the bike in a conspicuous place during the day and take it indoors at night.
- Do not lend the bike to a stranger.
- Record and register your bike's description and serial number with the local police department. This is the most effective tool in the recovery of stolen bikes.

While most chains and locks can be broken by a bicycle thief, they at least discourage them in their efforts.



CORRECT! The chain goes through both wheels, the frame and around the stationary object.

CORRECT! The chain goes through both wheels, the frame, and through the fence shown.



CORRECT! The chain goes through the wheel, the frame, and through the bicycle rack.

CHAPTER 13

BICYCLING AND PHYSICAL FITNESS

Excerpts from Article Written by
Herman K. Hellerstein, M.D.

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Faithful adherence to a program to enhance physical fitness and other good health practices has produced significant improvement of physical fitness, and of adequacy of the blood supply of oxygen to the heart muscle itself, decrease of body fat, lowering of blood pressure and of blood fats, as well as improvement in well being.

The key to the enhancement of physical fitness is to evaluate the functional capacity, before training and then to exercise for three or more sessions a week, each session 30 to 45 minutes, at an intensity to tax the capacity safely and sufficiently to cause an adaptation and improvement, in the function of the heart, lungs, and body muscles.

The equipment and apparatus necessary for the pretraining evaluation and for training should be readily available, be relatively inexpensive, and usable year around. The bicycle fulfills these requirements.

The capacity of the body to utilize oxygen depends upon the integrity of the oxygen system—the lungs, the blood, the heart, and the tissues. During exercise, the exercising muscles of the extremities and of the heart consume more oxygen and produce carbon dioxide. THE MAXIMAL OXYGEN CAPACITY (Max VO_2) is defined as the largest amount of oxygen that an individual can consume per minute. The way this is accomplished is to exercise the individual to his maximum—to his highest tolerated level—where he can do no more, even though urged to do so. Three features determine how large this value can be: the heart rate (HR), the amount of blood that the left ventricle can pump (eject) with each beat (called stroke volume) (SV), and the amount of oxygen the exercising muscles can extract from the blood.

The fitness of an individual can be best described in terms of the maximal oxygen uptake. However, the actual measurement of oxygen is complex and expensive since it requires intricate equipment and highly skilled personnel. Fortunately the oxygen cost of exercise on a calibrated bicycle ergometer (or a treadmill of known speed and inclination) has been measured and is quite constant from individual to individual. The heart rate cost for work of a known intensity can be readily measured by counting the pulse.

Out in the field, or in the gym, or on the highway, the exercising individual can get a good idea of how hard he is working by counting his heart rate and calculating the percent of his highest heart rate he is using.

Medical science has shown that physical fitness will improve only if an individual averages during training at least 70 percent of his maximal heart rate with peaks of 85 percent of his maximal heart rate. In the past much time was spent ineffectively because the intensity of training was too low. In other instances, excessively high levels were prescribed and produced overloading and often deleterious effects.

Use of the Heart Rate as a Measure of Training Intensity

Table 1 shows the average maximal heart rate for subjects from age 10 to 65 years, the desired average heart rate during each exercising period and the desired heart rate to be attained several times during each 30 to 45-minute exercising period.

TABLE 1

Recommended Target Heart Rates for Training

Average Maximal Heart Rates of Apparently Healthy Men

Ages (Years)	Maximal Heart Rate (MHR)	Target Heart Rates During Each Training Session (30-45 minutes)	
		Average (70% MHR)	*Peaks* (85% MHR)
15	210	147	179
20	200	140	170
25	195	137	166
35	185	130	157
45	175	123	149
55	170	119	145
65	165	116	140

Prescription for Attaining and Maintaining Fitness

The exercise prescription to attain and maintain physical fitness has developed into a fine and precise science. The general principles can be applied at all ages and in all states of health: (1) there must be a load placed on the muscles of the heart and legs, arms, torso, which is greater than the customary (relative overload); (2) the progression of the intensity exercise must be gradual and continuous; (3) exercise must be beneficial and pleasurable; (4) exercise must build both strength and muscular endurance; (5) exercise conditioning must be a part of a total plan of good health practices: diet, medication when indicated, adequate sleep and rest, and periodic reevaluation. The frequency of the training sessions should be 3 to 4 times per week; the duration of each session,

30 to 45 minutes; the intensity, average 70 percent, peaks of 85 percent of the maximal heart rate of the individual. The design of exercise should include warm up for at least 3 to 5 minutes, progressively harder periods of interval training 3 to 5 minutes, with 2 to 4 minutes of lower levels of effort, and 3 to 5 minutes of cool down. Hot showers immediately after high level effort should be avoided because of the dangers of dropping of the blood pressure or serious disturbances of the heart beat. The types of activities should include exercising of the arms as well as legs, and torso. For this reason, no single training program should be restricted to one method alone.

Size and Weight of Bicycle and Seat Adjustment

Appropriately selected bicycles will not only be safe but also less costly metabolically. The seat should be adjusted so that the knee is fully extended when the pedal is in the down position, in order to take advantage of the strength of the large group of extensor muscles (front part) of the thighs. The weight of the bicycle should be related to the body weight of the cyclist, and should be as light as possible without sacrificing structural strength and safety. The oxygen cost of bicycling depends upon the weight of the vehicle, of the cyclist, and the speed and the terrain.

Pre-Trip Conditions

The same precautions should be taken before undertaking a bicycle trip of several miles or more as on a long automobile trip or hike. At least 2 hours should elapse between the last meal and the beginning of a bicycle trip. Because of the advantage of carbohydrates as a rapid source of energy which is used more efficiently by the heart muscle than are fats, the meal should be low in fat and should be predominantly carbohydrates. Because the stores of glycogen in the exercising muscles are rapidly consumed by high levels of effort, for example 30 to 45 minutes of exercise at 75 to 85 percent of the individual's maximal heart rate, ready sources of carbohydrate (candy, fruit, apples, oranges) should be carried in anticipation of their need. A canteen of water should be carried to anticipate fluid loss.

Regulating the Pace of Speed and of Energy Expenditure

The essential ingredients described for exercise testing apply equally well in bicycling on the open road. There should be a gradual warm up period, consisting of cycling relatively slowly for the first 3 to 5 minutes, followed by periods of faster cycling for 5 to 6 minute intervals, interspersed with 2 to 3 minutes of slower cycling. This method of interval bicycling allows the muscles to perform more effectively, with a small oxygen debt, lower lactic acid accumulation, lesser fatigue, and in general better performance. With road conditions permitting, the speed of the interval periods can be increased, to increase strength. Cycling at a steady rate which is well below the maximal capacity will build up endurance for that level of effort. For example, if the cyclist moves at the speed of 5 miles per hour for one hour each day, for several weeks, his endurance will be at that level, but if he cycled for 30 minutes at 5 miles per hour and for 15 minutes at 10 miles per hour, although he would cover exactly the same distance per hour, his capacity would be better than endurance bicycling at a steady speed of 5 mph.

The rate of energy expenditure also influences the strength of the muscles being used. For example, in bicycling up an inclination–less energy will be used if a lower gear ratio is used. By changing the ratio of the sprocket to a smaller sprocket ratio on the back wheel the amount of energy used by each pedal turn is less. To climb the hill, more pedal turns will be required than if a higher gear ratio were used. However the higher gear ratio requires more energy for each pedal turn and hence more strength. By varying the gear ratio, especially in hill climbing, one can place larger or smaller loads on the muscle. As physical fitness improves, the experienced cyclist is able to climb hills with less resort to the low gear ratios. When fatigued, he should use the lower ratio.

The speed which the individual bicyclist can attain and maintain over an hour or longer is determined not only by the terrain, motivation, and gear ratio but also by his maximal aerobic (oxygen) capacity. For example, a middle aged man with body weight of 165 lbs. and maximal oxygen capacity of 35 ml O_2/minute per kilogram body weight (equal to 13 K Calories per minute) would be comfortable bicycling at 5.5 mph and 9.5 mph, which cost 4.7 and 7.5 K Calories per minute. However, bicycling at 13 mph would cost 11.8 K Calories per minute (90 percent of his capacity), and could not be maintained for prolonged periods.

Table 2 presents the relationships among bicycling speed, caloric expenditure and body weight.

TABLE 2

Approximate Calories Expended During Bicycling at Various Speeds

Average Bicycle Speed MPH	BODY WEIGHT 55 Lbs. Calories Per Min.	Hour	110 Lbs. Calories Per Min.	Hour	165 Lbs. Calories Per Min.	Hour
5.5	1.6	95	3.2	190	4.8	285
9.5	2.5	150	5.0	300	7.5	450
13.1	3.9	235	7.8	470	11.8	750

A significant amount of calories can be consumed by bicycling at lower speeds for long periods or higher speeds for shorter periods. By carefully balancing calories expenditure and food intake one can reduce the body weight while enhancing body fitness. In general the loss of one pound of weight requires the expenditure of 3500 extra calories. For a 75 Kg person this would require approximately 5 hours of bicycling at 13.1 mph, 7.7 hours at 9.5 mph or 13 hours at 5 mph (Table 2). For the subject who has no need to lose weight, an

extra intake of 3500 K Calories of food would be required after such effort. Bicycling offers the overweight person the joy of attaining a normal weight, and the normal weight person the pleasure of oral gratification.

Physiological Monitoring of the Pace

The pace of cycling is considered excessive if marked shortness of breath, marked pounding or irregularity of the heart beat, dizziness or uncoordination, muscle cramps, or tearfulness of the younger members appear. Since the purpose of a bicycling outing should be fun, there is little justification for inflicting discomfort on the deconditioned subjects. The pace should be downgraded until the individual recuperates. If necessary, the group can be separated into faster and slower groups, each proceeding at its own pace to arrive at the same prearranged destination.

Heart rate counting can be fun as well as instructive. Before beginning a trip, once everyone is set, fully mounted and checked out, count the pulse for one full minute. This provides some information which will be referred to later in the trip. Characteristically the younger members have faster heart rates, and the older members and the more physically fit younger ones have slower pulses. Periodically at the top of a hill, or after a long stretch, pulse rates will be counted, to give some idea of how each of the brood, including parents, are faring. Casual recording of heart rate provides valuable incentives for attaining physical fitness as well as insight into the physiology of training.

Other Fringe Benefits

The scientific literature contains many reports of the physiological and psychological benefits of bicycle training. They include a pleasurable way of controlling body weight, greater work capacity, slower heart rate, lower blood pressure at rest, at sleep and during effort, increased strength and endurance, and adequacy of the blood supply to the muscles of the extremeties and of the heart itself, and improvement in mood, emotional stability, and decrease of depression.

CHAPTER 14

RESOURCE AND MATERIAL

List of bicycle literature and educational materials—available free from:

Bicycle Institute of America, Inc.
122 East 42nd St.
New York, New York 10017

BMA Bike Safety Mailing Program
Send for Price List and Summary

Bicycle Manufacturers Association of America
1101 15th St., N.W.
Washington, D.C. 20005

Instructional Text

Effective Cycling, 1975 (Also Instructor Manual) by John Forester
Custom Cycle Fitments
782 Allen Court
Palo Alto, California 94303

Bicycle Digest by Mark Thiffault
Digest Books, Inc.
Northfield, Illinois

Inside Bicycling by Kieth Kingbay ($5.45)
Henry Regnery Co.
180 N. Michigan Ave.
Chicago, Illinois 60601

Supplemental Books

Anybody's Bike Book (Age 15 and over) by Tom Cuthbertson

Bike Tripping (Age 14 and over) by Tom Cuthbertson ($3.25)
Ten Speed Press
Box 4310
Berkeley, California 97414

Bicycle Repair and Maintenance (Age 14 and over) by Ben Burstyn ($6.95)
Arco Publishing Co., Inc.
219 Park Ave., So.
New York, New York 10003

Consumer Guide: Bicycles: Complete Bicycling Guide 1972, 384 pages (Age 16 and over) ($1.50 paperback)
Popular Library
355 Lexington Ave.
New York, New York 10017

Richard's Bicycle Book (Age, adult) by Richard Ballantine ($1.95 paperback)
Balantine Books, Inc.
201 East 50th St.
New York, New York 10022

The New Complete Book of Bicycling, 1974, 342 pages by Eugene Sloan ($12.50)
Trident Press
630 Fifth Ave.
New York, New York 10028

DeLong's Guide to Bicycles and Bicycling, 1974, by Fred DeLong
Chilton Book Company
Radnor, Pennsylvania

Pamphlets and Books

Bicycle Blue Book, 1977, 14 pages (Age 14 and over) (free)
Goodyear Tire & Rubber Co.
Public Relations Department
Akron, Ohio 44316

Bicycle Clubs: How to Organize and Enjoy Them, 1973, 59 pages (Age 15-18) ($.25)
Bicycle Mfg. Association of America
1101 15th St., N.W.
Washington, D.C. 20005

Bicycle Problems—Training Key No. 187, 1973, 6 pages (Age, adult) (one complimentary copy)
Professional Standards Division
International Chiefs of Police
11 Firstfield Road
Gaithersburg, Maryland 20760

Bicycle Safety, 1976, 6 pages (Age 12 and over) (free)
Aetna Life and Casualty
Audio Visual Resources
Hartford, Connecticut 06156

Sprocketman, 1976, 26 pages (Age 18-22)
U.S. Consumer Product Safety Commission
Washington, D.C. 20207

Bicycle Magazines and Newspapers

Bicycling! ($1.00/Month—$9.50/Year)
55 Mitchell Blvd.
San Rafael, California 94903

Bicycle Forum ($8.00/year)
814 Thayer Avenue, Suite 308
Silver Spring, Maryland 20910

Bike World ($1.00/Month–$8.50/Year)
Box 366
Mountain View, California 94040

Bicycle Spokeman
Bill Jarmey
19 South Bothnell
Palatine, Illinois 60067

BMX News ($5.00/Year)
12791 Newport Ave.
Tustin, California 92680

Velo News ($3.25/Year)
(Bicycle Racing)
140 Elliot St.
Brattlebora, Vermont 05301

Films and Filmstrips

Bicycle Driver Education – We Must Do More, 1975
Age: Adult
20 Minute, Color, 16 MM

Film promotes bicycle education in school systems. Examples of current bike programs from kindergarten through college are shown. The film is designed to be used by community leaders to motivate public officials and/or parents to demand public school bicycle safety.

Rental: Association Sterling Films
600 Grand Ave.
Ridgefield, New Jersey 07657

Bicycle Safety – You Can Prevent an Accident, 1975
Age: 12-18
28 Minute, Color, 16 MM

Rules, laws and identifying hazardous situations are emphasized.

Lee Stanley Films
17215 Bullock St.
Encina, California 91316

Bicycle Coaching Clips
Age: Senior High
10 Minutes, Color, 16 MM

Valdhere Films, Inc.
3060 Valleywood Drive
Dayton, Ohio 45429

Get To Know Your Ten Speed
Age: 16 and over
19 Minute, Color

The film illustrates how to properly use a ten-speed bicycle. It includes making adjustments, brake control, shifting gears, and observing traffic safety rules.

Oxford Films
1138 North LAS Palmas Ave.
Hollywood, California 90038

The Wonderful World of Bikes
Age: All
27 Minutes, Color, 16 MM

Association Sterling Films
600 Grand Ave.
Ridgefield, New Jersey 07657

On A Bicycle Built For You
Age: Adult
13 Minutes, Color, 16 MM (Free Loan)

The Huffman Manufacturer, Co.
P.O. Box 1204
Dayton, Ohio 45401

Bicycle Drivers Don't Have to Have Accidents
13½ Minutes

Golden Coast Film Productions
2044A Alameda Padre Serra
Santa Barbara, California 93103

Bike Wise, To Be Sure
Age: High School-Adult
14 Minutes, Color, 16 MM

Centrum Films
1621 West 9th St.
Box 687
Lawrence, Kansas 66044

The Bicycle Driver, 1973
Age: 12-18
14½ Minutes, Color, 16 MM

Emphasizes the legal rights and responsibilities of both the cyclist and motorists. Film makes the point that bikes have the same rights and responsibilities as motorists.

Safeco Insurance Company
Safeco Plaza
Seattle, Washington 98185

The Ten Speed Bicycle
15 MM, Color filmstrip–record or cassette narration

Public Utility Films, Inc.
1906 Academy Court
Claremont, California 91711

Bicycle on the Safe Side
Age: High school and adult
15 Minute, 16 MM

Ramsgate Films
704 Santa Monica Blvd.
Santa Monica, California 90401

Ride On
Age: Junior High School
15 Minute, Color, 16 MM

Contemporary/McGraw-Hill Films
Princeton Road
Highstown, New Jersey 08520

Only One Road, 1975
Age: 12-adult
26 Minute, Color, 16 MM

Stresses greater understanding and cooperation between bicyclists and motorists to safely share the roadways. Case studies illustrate how bike/car traffic mix can be less hazardous.

Available from local AAA Club:
AAA Foundation for Traffic Safety
8111 Gatehouse Rd.
Room 328
Falls Church, Virginia 22042

Organizations

American Youth Hostels, Inc.
20 West 17th St.
New York, New York 10071

Bicycle Institute of America, Inc.
122 East 42nd St.
New York, New York 10017

International Bicycle Touring Society
c/o Dr. Clifford Graves
846 Prospect Street
LaJolla, California

League of American Wheelmen, Inc.
256 Robert Ave.
Wheeling, Illinois 60090

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